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FIRST ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF OHIO,

FOR THE

YEAR ENDING OCTOBER 31, 1886.

COLUMBUS:

MYERS BROS., STATE PRINTERS.

1887.

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RESOLUTION OF THE BOARD RELATIVE TO PAPERS PUBLISHED IN ITS ANNUAL REPORT.

Resolved, That no papers shall be published in the Annual Report of this Board, except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who is entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein.

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MEMBERS OF THE BOARD.

	Term expires
W. H. CRETCHER M.D., PR <small>ESIDENT</small> , Bellefontaine	December, 1886.
T. CLARKE MILLER, M.D., Massillon ..	December, 1887.
JOHN D. JONES, M.D., Cincinnati	December, 1887.
SIMON P. WISE, M.D., Millersburg..	December, 1889.
D. H. BECKWITH, M.D., Cleveland	December, 1890.
THOMAS C. HOOVER M.D., Columbus.....	December, 1891.
H. J. SHARP, M.D., London.....	December, 1892.

C O. PROBST, M.D., *Secretary*.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
COLUMBUS, OHIO, *October 31, 1886.*

To Hon. J. B. FORAKER, Governor of Ohio:

SIR: In accordance with Section 8 of the "Act to create and establish a State Board of Health in the State of Ohio," the accompanying report is herewith submitted for the year ending October 31, 1886.

Very respectfully,

C. O. PROBST, *Secretary.*



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INTRODUCTORY STATEMENT.

The law creating a State Board of Health was enacted April 14, 1886, and a permanent organization of the Board was effected May 18, 1886. Consequently this report embraces a period of less than six months.

The Board was unfortunate in having to twice change its secretary within the first three months of its existence, thus seriously interrupting the inaugural work, to be done. It has labored under a further disadvantage in having no office assigned the secretary for his work. Through the kindness of the Attorney-General, the use of his office was temporarily granted until suitable rooms could be provided. The property of the Board, however, has already accumulated beyond the space at his disposal.

Considering the brief period of the Board's existence, this report must necessarily deal with the methods rather than the fruit of its operations.

It is perhaps unnecessary to enter a plea for the existence of such an organization in the State; the fact that Ohio was the thirty-second State in the Union to create such a Board, with the practical results obtained by other State Boards of Health, offers the best argument for its possible usefulness.

The objects of the Board are defined in Sections 2 and 3 of the act creating it.

The knowledge of the people regarding the laws of health is less perhaps than of any other subject so nearly concerning them.

The erroneous beliefs and opinions of our ancestors, are in many instances still entertained, and people yet wear the bag of assosfetida to ward off contagious diseases.

A large number of beneficent laws, guarding the health of the people have been already enacted, and will give to the Board the power of meeting many of the conditions injuriously affecting the healthfulness of the State, but, as has been indicated by the Act creating the Board, an important feature of its work will be to point out the defects in existing laws, and to recommend from time to time the legal measures necessary to secure the object of its creation.

One of the first endeavors of other State Boards of Health, has been to organize efficient local boards throughout the State, and it is admitted by all that this is one of the pre-requisites for successful sanitary work.

The present law, which makes such organizations to depend upon the pleasure of the town council, has been found inadequate, but a small number of

the cities and towns of the State having boards of health; and when such boards are created the men best fitted for this important work, are not usually selected.

The compulsory formation of an efficient board of health, in every city, town and village of the State, is to be greatly desired, and if, in addition, the appointment of a qualified health officer, to receive an adequate compensation, were obligatory with the board, the sanitary interests of each locality of the State would receive the proper attention.

With such a systematic organization, the State Board could secure the enforcement of such rules and regulations as found necessary from time to time in protecting the health of the State.

This subject is dealt with by the President, Dr. W. H. Cretcher, in his annual address to the Board, and we would respectfully call your attention to the recommendations contained therein.

The Board has been given the supervision of the State system of registration of births and deaths, and in another part of this report will be found certain facts relating to the inefficiency of the present system of registration. The question is one of great importance, and various methods for collecting such returns have been made in this and other countries.

Complete returns of marriages, births and deaths, however, have never yet been collected, and until the people are educated as to the value of such returns, it is probable that no method adopted will accomplish this result.

Such collections of facts, are generally supposed to be of use only to physicians and others interested in statistical questions; such an opinion, however, is far from the truth. Preceding all effort towards abating disease must come a definite knowledge of the causes in operation to produce it. Such knowledge can in many instances be gained only by a study of the vital statistics of a State or community, in connection with the surroundings and habits of its people.

It is hoped to secure such legislation in this State as will give the most complete returns possible.

A number of nuisances have been complained of to the Board. In most instances, these should be dealt with by local authorities, and one of the great advantages to be derived from the appointment of local health officers is their early appraisal and abatement of such nuisances, being easily accessible and cognizant of all the facts in the case. Other cases, however, demand the attention of the State Board, and it should be invested with powers to meet the requirements of such demands. Often powerful corporations, representing immense money interests, are the offenders, and it is especially in such instances that a higher power than the individual who may be injuriously affected thereby, is called upon to secure the rights of the people. Such an

instance has already come before the Board, demanding its action in the interests of the health of the people.

We refer to the pollution of the streams of the State by the refuse of paper mills and straw board works, situated upon their borders. For a further consideration of this subject, we refer you to the report of Dr. H. J. Sharp, chairman of the committee on "Water Sources, etc."

The subject of epidemic and endemic diseases, has received special attention from the Board. The fact of these diseases contributing so largely to the death rate each year, and that they are in great measure preventable diseases, makes this subject a most important one in sanitary work.

The only disease of this class which has prevailed extensively in the State since the Board's creation, is diphtheria. It is impossible at this time to estimate the number of cases which have occurred.

Reports from correspondents show it to have been limited to no part of the State. The death rate has varied greatly in different places. In some nearly all cases ending in recovery, in others nearly 40 per cent. dying.

The means adopted by the Board to prevent the spread of this dread malady are detailed in another part of this report. If upon the first appearance of this disease in a community, it could have been taken in charge by an efficient health officer, and dealt with in the manner recommended by the Board for its restriction, there can be little doubt that many lives could have been saved.

Two epidemics have required investigation by the Board. One at Bellaire, where a number of cases of typhoid fever occurred—the other near East Rochester, Columbiana county, where malarial fever of a severe type prevailed.

The results of the former investigation are given in the report of Dr. S. P. Wise, chairman of the committee on "Epidemic and Endemic Diseases, etc.," and in the report of Dr. Sharp, before mentioned, on "Water Sources, etc."

A report of the East Rochester investigation was made by Dr. T. Clarke Miller, and is included in the secretary's report.

The subject of the adulteration of food, drinks, etc., has received the attention of the chairman of that committee, Dr. D. H. Beckwith, and appears as a special paper.

The importance of this subject in connection with the health of the people needs no comment. It is a fact, notorious, that the adulteration of food is only limited by the impossibilities of concealing or disguising it. A crime, to be punished, must first be established, and the Board will be of great benefit in investigating and publishing the fraudulent and injurious adulterations of the food supply of the State.

There is probably no question of more vital interest to the welfare of the State

than the health of its school children. At no time are injurious surroundings attended with more baneful effects than during this period of active, mental and physical growth.

The evil effect of faultily constructed school-houses is deserving of special consideration. While some attention is now given to the sanitary requirements of such buildings, it is too often the case that the main question to be answered in their construction is, how to secure the greatest possible capacity at the least possible cost.

The proper method of heating, lighting and ventilating our school buildings is a matter of too great importance to be left to chance or the whim of an architect. It should be required that a plan of every public building hereafter erected, be referred to the State Board of Health for approval. This subject has been considered by Dr. John D. Jones, and appears as a special paper in the accompanying report.

A codification of the laws of the State relating to the health of the people and of the stock and domestic animals, has been prepared by the Attorney-General. This work will be of great value to the Board, and to local boards of health and health officers, presenting, in ready form, the laws empowering them to act—where legal proceedings are demanded.

A feature of the Board's work has been the collection of reports of prevailing diseases from the physicians of the State.

It is hoped to secure a correspondent in each locality of the State, when fairly accurate reports can be given weekly of the prevailing diseases.

A health bulletin is issued, weekly, based on the reports received from regular correspondents. These bulletins are published in a large number of newspapers, and will be of service to the public in pointing out the localities in which dangerous communicable diseases prevail.

With this bulletin it is designed to publish a meteorological report, from which a study can be made of the effect of atmospherical changes in producing or modifying disease.

The organization of the Board, with an abstract of its proceedings will be found under the Secretary's report.

ACT CREATING THE BOARD.

SECTION 1. *Be it enacted by the General Assembly of the State of Ohio*, That the governor with the advice and consent of the senate, shall appoint seven persons, who (with the attorney-general, who shall be ex-officio a member of said board) shall constitute a state board of health ; provided, that the terms of office of the seven first appointed shall be so arranged that the term of one shall expire on the thirteenth day of December of each year, and the vacancies so created, as well as all vacancies occurring otherwise, shall be filled by the governor, with the advice and consent of the senate : and provided, also, that appointments made when the senate is not in session, may be confirmed at its next ensuing session.

SEC. 2. The state board of health shall have the supervision of the interests of the health and life of the citizens of the state. They shall make careful inquiry in respect to the causes of disease, and especially the invasion or spread of any infectious or contagious, epidemic, or endemic disease, and investigate the sources of mortality and the effects of localities, employments, conditions, ingesta, habits and surroundings on the health of the people ; and shall investigate the causes of diseases occurring among the stock and domestic animals of the state, the methods of remedying the same by quarantine or otherwise, and shall gather information in respect to such matters, and kindred subjects for dissemination among the people. They shall advise officers of the government, or other state boards, in regard to the location, drainage, water supply, disposal of excreta, heating and ventilating of public buildings. They shall collect and preserve such information relating to forms of disease and death as may be useful in the discharge of the duties of said board. It shall be the duty of all local boards of health, health authorities and officers, officers of state institutions, police officers, sheriffs, constables, and all other officers and employes of the state, or any county, city or town thereof, to make and enforce such quarantine and sanitary rules and regulations as may be necessary to protect the public health, in so far as the success and efficiency of the board of health may depend thereon, and in the event of failure or refusal on the part of any member of said boards, or other officials or persons in this section mentioned to so act, he or they shall be subject to a fine of not less than fifty dollars upon first conviction, and upon a conviction of second offense of not less than one hundred dollars.

SEC. 3. The board of health shall have supervision of the state system of registration of births and deaths as hereinafter provided ; they shall make up such forms and recommend such legislation as shall be deemed necessary for the thorough registration of vital and mortuary statistics throughout the state. The secretary of the board shall be the superintendent of such registration. The clerical duties and the safe-keeping of the bureau of vital statistics thus created shall be provided by the secretary of state.

SEC. 4. It shall be the duty of boards of health, health authorities and officials, and of physicians in localities where there are no health authorities or officials, to

report to the state board of health, promptly upon discovery thereof, the existence of any one of the following diseases which may come under their observation, to-wit: Asiatic cholera, yellow fever, small-pox, scarlet fever, diphtheria, typhus and typhoid fever, and of such other contagious or infectious diseases as the state board may from time to time specify.

SEC. 5. All amounts recovered under the penalties herein provided, shall be appropriated to a special fund for the carrying out the objects of this law.

SEC. 6. The first meeting of the board shall be within thirty days after their appointment, and thereafter in January and June of each year, and at such other times as the board shall deem expedient. There shall not be more than three called sessions of the board in [any] one year, and no session of the board shall continue longer than three days. The meeting in January of each year shall be in Columbus. A majority shall constitute a quorum. They shall choose one of their number to be president, and they may adopt rules and by-laws for their government, subject to the provisions of this act.

SEC. 7. They shall elect a secretary, who shall perform the duties prescribed by the board and by this act, and who shall, upon cause, be removed by a majority vote; he shall receive a salary, not to exceed sixteen hundred dollars (\$1,600) per annum, which shall be fixed by the board; he shall also receive his traveling and other expenses incurred in the performance of his official duties. The other members of the board shall receive five dollars per day, and their traveling and other expenses while employed on business of the board. The president of the board shall, quarterly, certify the amount due the members, and on presentation of his certificate the auditor of state shall draw his warrant on the treasurer for the amount.

SEC. 8. It shall be the duty of the board of health to make an annual report, through their secretary or otherwise, in writing, to the governor of the state, on or before the first day of November of each year, and such report shall include so much of the proceedings of the board, and such information concerning vital statistics, such knowledge respecting diseases, and such instructions on the subject of hygiene, as may be thought useful by the board for dissemination among the people, with such suggestions to legislative action as they may deem necessary.

SEC. 9. The sum of five thousand dollars (\$5,000), or so much thereof as may be necessary, is hereby appropriated to pay the salary of the secretary, meet the contingent expenses of the office of the secretary, and expenses of the board, and all costs of printing, which, together, shall not exceed the sum hereby appropriated; said expenses shall be certified and paid in the same manner as the salary of the secretary.

SEC. 10. The adjutant-general shall provide rooms suitable for the meetings of the board, and office room for the secretary.

SEC. 11. This act shall take effect and be in force from and after its passage.

SECRETARY'S REPORT.

ORGANIZATION OF THE BOARD.

In accordance with the provisions of the "act to create and establish a State Board of Health in the State of Ohio," the Governor appointed the following named persons as members of the Board:

Dr. W. H. Cretcher.....	Bellefontaine.
Dr. T. Clarke Miller	Massillon.
Dr. John D. Jones.....	Cincinnati.
Dr. Simon P. Wise.....	Millersburg.
Dr. D. H. Beckwith	Cleveland.
Dr. Thomas C. Hoover.....	Columbus.
Dr. H. J. Sharp	London.
Hon. J. A. Kohler, Attorney-General [ex-officio.]	

ABSTRACT OF THE PROCEEDINGS OF THE FIRST FOUR MEETINGS OF THE BOARD.

FIRST MEETING OF THE BOARD.

The first meeting of the State Board of Health was held in Columbus in the office of the Governor, April 30, 1886. The following members were present: Dr. W. H. Cretcher, Dr. H. J. Sharp, Dr. J. D. Jones, Dr. T. C. Miller, Dr. S. P. Wise, Dr. D. H. Beckwith, Dr. T. C. Hoover and Hon. J. A. Kohler. A temporary organization was effected by electing Dr. H. J. Sharp chairman, and Dr. J. D. Jones secretary.

It being found that all the members had not been duly qualified it was decided to continue the temporary organization until May 18, 1886.

Committees were appointed to draft rules and by-laws, to examine the laws relating to the powers and duties of the Board, and to devise a plan for the best division of the work of the Board among standing committees.

The Secretary was requested to correspond with other State Boards of Health asking copies of their annual reports.

The Board then adjourned to meet in Columbus, May 18, 1886.

SECOND MEETING OF THE BOARD.

The second meeting of the State Board of Health was held at Columbus in the office of the Attorney-General, at 8 P. M., May 18, 1886, all the members being present.

The meeting was called to order by Dr. H. J. Sharp, President *pro tem*. The minutes of the last meeting were read and approved.

Upon motion of Dr. Miller it was decided that the office of the Secretary should be located at Columbus.

The Board proceeded to effect a permanent organization by electing Dr. W. H. Cretcher, of Bellefontaine, President, who assumed the chair.

The salary of the Secretary was fixed at sixteen hundred dollars a year. A ballot was taken for the election of a permanent Secretary, which resulted in the choice of Dr. G. C. Ashmun, of Cleveland, who was introduced to the members and entered upon his duties. A vote of thanks was tendered Dr. Sharp and Dr. Jones for their services as President and Secretary *pro tem*.

Dr. Sharp reported from the committee on "Rules and By-Laws," Dr. Jones from the committee on "Standing Committees," and Dr. Miller from the committee on "Vital Statistics." The reports were received and the committees discharged.

The Board adjourned to meet at 9 A. M. the following day.

The Board met pursuant to adjournment, all the members being present except Dr. Sharp. The minutes of the last meeting were read and approved.

On motion of Dr. Miller they proceeded to the consideration of the report on "Rules and By-Laws," which was read by the Secretary. The following rules and by-laws were finally adopted:

BY-LAWS OF THE OHIO STATE BOARD OF HEALTH.

ARTICLE I.

SECTION 1. The regular meetings of the Board shall be as provided by the act establishing the Board, and in April and September of each year, convening on the third Wednesday in the months named at 7 o'clock, P. M., and the meeting in June shall be the annual meeting.

SEC. 2. All meetings of the Board, except the annual meetings, may be called at any time or place by the Secretary at the request of the President or any three members of the Board, by giving proper notice of the time, place and object of the meeting to all the members of the Board.

ARTICLE II.

SECTION 1. The election of the President of the Board shall take place at the annual meeting in June of each year, the President to take his seat at the regular meeting in the following September.

SEC. 2. In the absence of the President a President *pro tempore* may be chosen by the members of the Board.

SEC. 3. The President shall preside at the meetings of the Board and perform such other duties as custom and parliamentary usages require.

SEC. 4. At the September meeting of the Board the President shall present his annual address.

SEC. 5. The Secretary shall be elected by ballot, and shall hold office as provided in Section 7, of the act establishing the Board. He shall be the custodian of all books, pamphlets and other property of the Board that it is deemed advisable to file and keep at a central office, and shall forward such papers as may properly concern any standing committee to the chairman of such committee after proper memoranda of leading facts have been made. At the September meeting of each year, he shall submit a written report for the fiscal year, embodying therein a true account of the nature and amount of all property belonging to the Board, which has been received, issued, or destroyed since the last preceding report; amount of property remaining on hand and also in whose care each item of property is intrusted, and this report shall constitute the basis of the report of the Board to be presented to the Governor on or before the first day of November in each year, as provided in Section 8, of the act constituting the Board.

SEC. 6. The Secretary shall be paid the sum of sixteen hundred dollars per annum.

SEC. 7. The Secretary shall present an itemized statement of his necessary traveling and other expenses incurred by him while in the discharge of his official duties, and which, before it is paid, shall be approved by the finance committee in writing, and the same shall be paid upon the certificate of the President.

ARTICLE III.

SECTION 1. Standing committees shall be appointed on the following subjects, viz.:

- (1.) Vital statistics, registration and nomenclature.
- (2.) Hygiene of occupations and railway sanitation.
- (3.) Epidemic and endemic diseases and quarantine.
- (4.) Topography, meteorology and hygiene of public institutions.
- (5.) Water-sources, sewerage, drainage, and disposal of substances injurious to health.
- (6.) Especial sources of danger to life and health (*i.e.* poisons, explosives, mechanical devices, etc.)
- (7.) Finance and executive (three members.)
- (8.) Adulteration of food, drinks and drugs.
- (9.) Heating, ventilation, lighting and hygiene of schools.
- (10.) Diseases of domestic animals and live stock.

SECTION 2. The committee on Finance and Executive shall consist of three members, and the committee on Diseases of Domestic Animals and Live Stock shall include all the members of the Board. All other standing committees shall consist of one member of the Board, and the Secretary *ex-officio*.

SECTION 3. The President shall, by and with the consent of the Board, appoint at each annual meeting the standing committees, which hold office for one year and until their successors are appointed, and which shall make a report, in writing, of such matter and facts as may pertain to the subjects of the respective committees, on or before the regular meeting in September of each year.

SECTION 4. The President may appoint special committees at any time.

SECTION 5. All papers for the annual report shall be prepared and in the hands of the Secretary before the September meeting.

ARTICLE IV.

Committee on Finance and Executive.

SECTION 1. This committee shall have supervision of the finances, purchases and publications of the Board.

SECTION 2. Its meetings shall be held quarterly, and when deemed necessary, at the call of its chairman.

SECTION 3. It shall be the duty of the Secretary of the Board to make requisition for such printed forms, stationery and books for registration and record as are necessary to carry into effect the provisions of section three of the act establishing the Board.

SECTION 4. No purchases shall be made or expenditures incurred, except by order of the Board, or of the executive committee, and the executive committee shall not have power to incur any indebtedness beyond the amount appropriated by law.

ARTICLE V.

Order of business at regular meeting.

1. Calling of roll.
2. Reading of the minutes of last meeting.
3. Report of Secretary, and communications by the President and other members of the Board.
4. Reports of standing committees.
5. Reports of special committees.
6. Unfinished business.
7. Miscellaneous business.
8. Adjournment.

ARTICLE VI.

[SEAL].

ARTICLE VII.

These rules and by-laws may be amended or repealed at any regular meeting of the Board, by a majority vote of the members of the Board.

The President announced the following as chairmen of the standing committees for the ensuing year:

Topography, meteorology, and hygiene of public institutions, Dr. W. H. Cretcher, Bellefontaine.

Water-sources, sewerage, drainage, and disposal of substances injurious to health, Dr. H. J. Sharp, London.

Hygiene of occupations and railway sanitation, Dr. Jno. D. Jones, Cincinnati.

Heating, ventilation, lighting, and hygiene of schools, Dr. T. Clarke Miller, Massillon.

Epidemic and endemic diseases and quarantine, Dr. Simon P. Wise, Millersburg.

Adulteration of food, drinks and drugs, Dr. D. H. Beckwith, Cleveland.

Especial sources of danger to life and health (*i.e.* poison, explosives, etc.), Dr. Thos. C. Hoover, Columbus.

Vital statistics and nomenclature, the Secretary.

Diseases of domestic animals and live stock, all the members of the Board.

Finance and executive, Dr. Miller, Dr. Sharp and Dr. Hoover.

The State Board of Health adjourned to meet in Cleveland on the third Tuesday in June, 1886.

THIRD MEETING OF THE BOARD.

The third meeting of the Board was held in Cleveland, in the rooms of the City Board of Health, on the evening of June 15, 1886.

The meeting was called to order by the President, Dr. Cretcher, the members all being present, with the exception of the Attorney-General.

The minutes of the last meeting were read and approved.

A communication was presented by Dr. Ashmun, resigning his position as Secretary of the Board. On motion of Dr. Hoover, the resignation was accepted.

By request, Dr. Ashmun consented to act as Secretary for the present meeting.

A number of communications from physicians and others were read and received.

Dr. Cretcher read a letter from Dr. Jones, of Gower, O., reporting a case of small-pox at that point.

The letter was ordered filed and answered by the Secretary.

The President was requested to communicate with Dr. Jones as to other cases, and the means taken to prevent the spread of the disease. (The patient was promptly isolated—no other cases occurred).

Dr. Cretcher stated that an epidemic of typhoid fever had been reported at Bellaire, O., which was supposed to be connected with the pollution of the water supply of that city by the sewage of Wheeling, W. Va.

On motion, Dr. Sharp and Dr. Wise, as chairmen of the committees relating to this subject, were instructed to visit Bellaire and investigate the cause and extent of the epidemic.

The Board adjourned to meet the following day.

June 16—2:30 P. M: The Board met pursuant to adjournment, Dr. Cretcher in the chair, all the members present, except the Attorney-General.

The Board proceeded to fill the vacancy occasioned by the resignation of Dr. Ashmun, as Secretary. On ballot, Dr. G. B. Case, of Cleveland, was elected.

The executive committee was instructed to make arrangements for an office in the State House.

On motion of Dr. Hoover, 1,000 copies of a circular which had been prepared, were ordered printed.

Dr. Case, Secretary-elect, was introduced, and entered upon his duties.

The question of assigning each member of the Board a district of the State for the distribution of the above-mentioned circular, was discussed by different members of the Board.

It was decided that the Secretary should arrange the districts.

The Secretary was instructed to procure suitable stationery for the use of the Board.

The Board adjourned to meet the third Tuesday in October, 1886, unless a special meeting should be called before that time.

FOURTH MEETING OF THE BOARD.

A special meeting of the State Board of Health was called by the President July 27, 1886.

The Board was called to order at 8 P. M., Dr. Cretcher presiding.

The following members were present: Dr. Wise, Dr. Sharp, Dr. Hoover, Dr. Cretcher and the Attorney-General.

The minutes of the last meeting were read, and, with some corrections, adopted.

A communication was read from Dr. A. M. Chilcote, of Bloomdale, Wood county, reporting scarlet fever at that point; thirty-five cases had been reported, with six deaths.

Dr. Miller presented a number of letters relating to the pollution of the Tuscarawas river at New Portage from the refuse of the straw board works at that point.

As a result of this pollution the fish were dying in large numbers, and causing, by their putrefaction, a terrible stench near the river.

In this connection, the Attorney-General reported a similar condition of the rivers in Summit county, due to a like cause.

On motion of Dr. Hoover, the subject was referred to the committee on "Water Sources, Sewerage, etc," to report on the following day.

Dr. Miller read a communication from Dr. Gray, of Piqua, Miami county, relative to a bad sanitary condition of the Miami County Infirmary. This led to a general discussion regarding the sanitary condition of public institutions.

A committee, consisting of Dr. Hoover, Dr. Sharp and the Secretary, was appointed to draft a circular letter to be sent to the physicians of Ohio asking their co-operation, and urging them to act in their respective communities for the establishment of local Boards of Health.

In connection with this letter it was decided to send a copy of the act creating the State Board of Health.

The Secretary was instructed to act with the committee in the work of codifying the health laws of the State.

REPORT OF THE STANDING COMMITTEES.

Dr. Wise, Chairman of the committee on "Epidemic and Endemic Diseases and Quarantine," made a verbal report of his visit to Bellaire.

He stated that there had been three hundred and eight cases of typhoid fever reported there, with a much larger number who had been slightly ill. Dr. Wise agreed with the physicians of Bellaire, that the bad sanitary condition of the town had had much to do with the epidemic, and that impure water had not been the only agent.

On motion of Dr. Sharp, the report was accepted, and Dr. Wise requested to continue the investigation.

Dr. Sharp, Chairman of the committee on "Water Sources, Sewerage, etc.," also made a verbal report of the Bellaire investigation. He submitted a diagram of the town showing that its sewers and drains empty into Indian run—the run discharging into the river near the point of intake of the water supply of the town.

Every opportunity was thus afforded for contaminating the water supply of the town with its own sewage.

Dr. Sharp reported that the Wheeling authorities had expressed their intention of disposing of their garbage and night soil either by burning or by providing a garbage boat to convey it down the river below Bellaire.

The report of Prof. Howard on the chemical analysis of samples of the Bellaire water, was read in this connection, showing it to be impure.

On motion, the report of Dr. Sharp was accepted.

The Board adjourned to meet the following day.

At 8:30 A. M., the Board was called to order by the President pursuant to adjournment.

The members were all present except Dr. Jones and Dr. Beckwith.

Dr. Case tendered his resignation as Secretary, which, on motion of Dr. Wise, was accepted. By request, Dr. Case consented to act as Secretary for the remainder of the meeting.

The Board then proceeded to the election of a Secretary, which resulted in the election of Dr. C. O. Probst, of Columbus.

The subject of straw board works, and the pollution of streams receiving their refuse, was again opened for discussion.

Dr. Sharp read a letter, in this connection, from the Clerk of the Board of Health of Tiffin, Ohio, to Governor Foraker, relating to the condition of the Sandusky river at that place.

On motion of Dr. Hoover, the Attorney-General was requested to furnish instructions to the committee on this subject as to the proper steps to be taken to abate this nuisance.

Dr. Sharp offered the following resolution :

Resolved, That the State Board of Health appreciates the kind favor and assistance of Professor C. C. Howard, of the Starling Medical College, in the analysis of the samples of water from Bellaire, O., and asks him to accept this acknowledgement and the thanks of the Board for such services.

The Secretary was instructed to convey this expression of the Board to Professor Howard.

The Finance Committee approved a number of outstanding accounts against the Board, which were signed by the President and ordered paid.

The Board then adjourned to meet the third Tuesday in October, 1886.

WORK OF THE BOARD AND OF THE OFFICE.

In considering the work of the Board, as transacted at the Secretary's office, it will be convenient to classify it under two heads: The *collection* and the *dissemination* of information tending to promote the public health. Special work will receive a separate consideration.

COLLECTION OF INFORMATION.

The following circular was printed on postal cards, and each member assigned a district of the State, for its distribution.

CIRCULAR.

A State Board of Health has been established and organized with its office at the Capital of the State.

All persons interested in the improvement of the sanitary condition of the State, and prevention of disease among the people, are invited to aid and co-operate with the Board in its efforts to fulfill the objects for which it was established. For this purpose, the Board desires replies to the following questions:

1. Is there a local Board of Health, or health officer in your place or vicinity?
Ans.....
2. If so, will you kindly furnish the address? Ans.....
3. If not, will *you* serve as a local correspondent of the Board? Ans.....
4. If you cannot serve, will you suggest the name of some suitable person that would act? Ans.....

Respectfully yours,

W. H. CRETCHER, M. D., *President*,

GUY B. CASE, M. D., *Secretary*.

Name.....

Address.....

A large number of these were mailed to physicians, and 542 replies were received. A supply of blank forms for weekly reports was sent to all those consenting to act as correspondents of the Board. For convenience, these

were printed on postal cards, and addressed to the Ohio State Board of Health, Columbus, Ohio.

The form was as follows :

Report of Deaths.

.....TownCounty,
for the week ending Saturday noon18—.

Causes of Death.	Cases.	Deaths.
Accidents and deaths by violence
Cerebro-spinal meningitis.
Consumption (Phthisis pulmonalis).....
Croup
Diarrhoeal diseases
Diphtheria
Erysipelas.....
Fever { Typhoid
{ Malarial
{ Scarlet
Acute Lung { Pneumonia.....
Disease { Congestion of lungs
{ Bronchitis, acute
{ Pleurisy.....
Measels
Puerperal diseases.....
Small-pox
Whooping cough
Population
Annual rate per thousand.....
Deaths from all causes.....
Deaths under 5 years.....
Remarks
Signature

Please note any mortality from unusual causes not specified in this blank. Please report cases of small-pox, and the prevalence to a great extent of any disease.

It was the first endeavor to secure a correspondent, who would collect from each physician in his neighborhood, a report of the cases occurring in his practice.

This was soon found to be impracticable, as the busy practitioner could not well sacrifice the time required for such weekly collection; accordingly the following circular of instructions was prepared, and sent to all correspondents:

CIRCULAR No. 3.

OFFICE OF THE SECRETARY, STATE BOARD OF HEALTH,
COLUMBUS, OHIO.

To Correspondents of the Board :

DEAR SIR: We respectfully invite your attention to the following directions for making out your weekly reports :

1. Please do not fail to give each week the name of *county, town, and date.*
2. Report *only* the cases occurring in your own practice.
3. Report all cases under your care during the week, whether previously reported or not.
4. In cases of death, by accident, state briefly the cause, *i.e.,* drowning, gunshot wounds, etc.
5. Should a case of *small-pox* or *cholera* come in *any way* to your knowledge, *send an extra card at once,* giving the source of your information, and time the patient was first taken sick.
6. When *scarlet fever, typhoid fever, spotted fever, diphtheria, or other contagious, or infectious disease,* assumes anything like endemic proportions, *send an extra card at once,* giving the number of cases in your town, when possible, and the mortality.
7. Mail your weekly report not later than Monday. *Saturday would be greatly preferable.*
8. When you have neither cases nor deaths to report, you need not send a card.
9. Please make a special report by letter, of anything occurring in your neighborhood which you think would be of use or interest to the Board.

To do this will require some labor on your part, and we feel that we are asking much of an already over-burdened profession. But ours has ever been the first to respond to the cry of suffering humanity, and we confidently look to you for aid in advancing the great cause of *Preventive Medicine.*

We will issue weekly bulletins based on the reports of our correspondents. It rests with the medical profession to make these of value to themselves and to the State.

This bulletin we will take pleasure in sending you weekly, and when our annual report is issued we will gladly give credit, by name, to all who have aided in our work. Please preserve all circulars for future reference.

By order of the Board.

C. O. PROBST, M. D., *Secretary.*

The result was a considerable gain in the number of correspondents.

In October a change was made in the weekly report card. A number of diseases were added to the list, and others—as “Diarrhoeal diseases” made more specific.

By classifying the cases reported, under the heads “*New Cases*” and “*Old Cases,*” it is possible to know those newly occurring, and also the entire number of cases being treated, a knowledge of the latter, being especially desirable in communicable diseases.

The following form was adopted for the weekly report card :

Weekly Report of Diseases and Deaths.

.....TownCounty,
for the week ending Friday188—.

Form of disease.	New cases.	Old cases.	Deaths.
Bronchitis, acute .....	.....	.....	.....
Brain, inflammation of .....	.....	.....	.....
Bowels, inflammation of .....	.....	.....	.....
Consumption, pulmonary .....	.....	.....	.....
Cholera infantum .....	.....	.....	.....
Cholera morbus .....	.....	.....	.....
Croup, membranous.....	.....	.....	.....
Cerebro-spinal meningitis.....	.....	.....	.....
Diphtheria .....	.....	.....	.....
Dysentery .....	.....	.....	.....
Erysipelas .....	.....	.....	.....
Fever	Typhoid .....	.....	.....
	Typho-malarial .....	.....	.....
	Intermittent .....	.....	.....
	Remittent .....	.....	.....
	Scarlet .....	.....	.....
	Puerperal .....	.....	.....
Measles .....	.....	.....	.....
Pneumonia .....	.....	.....	.....
Pleurisy .....	.....	.....	.....
Rheumatism, acute.....	.....	.....	.....
Small-pox .....	.....	.....	.....
Tonsilitis .....	.....	.....	.....
Whooping-cough .....	.....	.....	.....

Remarks

Signature.....M.D.

This card was accompanied by the following letter of directions :

CIRCULAR NO. 4.

OFFICE OF THE SECRETARY, STATE BOARD OF HEALTH,
COLUMBUS, OHIO.

DEAR SIR:—I send you inclosed, blanks for making weekly reports of diseases, coming under your observation :

In making out your report, I beg you to carefully observe the following directions :

1. Under " New Cases," give those seen for the first time.
2. Under " Old Cases," give those previously reported, but still sick.
3. Under " Deaths," include those dying during the week for which the report is given, and do *not* include, under " cases," any one so reported.
4. Report *only* cases of your own observation. Include all your cases in one report, whether occurring in your city, county or other counties.
5. Be sure, *each week*, to give *county, town and date*, with your signature. Mail your report on Saturday, if possible.
6. When you have neither cases nor deaths to report, you need not send a card.

7. Please make a special report by letter, of anything occurring in your neighborhood, you think would be of service or interest to the Board.

We would be greatly indebted to you, for the names and addresses of physicians of your acquaintance, who will consent to act as our correspondents, and will gladly furnish such the necessary blanks, on application.

A health bulletin, based on the reports of our correspondents, is issued every Tuesday. For this reason, it is desirous your report should reach us on Monday.

A copy of our bulletin will be sent you weekly, and in our annual report we will take pleasure in giving credit to all who have aided in our work.

The value of our bulletin must rest with the medical profession, and we feel assured they will give us that generous aid they have ever so readily given to all objects of science and philanthropy.

Please preserve all circulars of the Board, for future reference.

Address all communications to

C. O. PROBST, M.D., *Secretary, Columbus, O.*

On a subsequent page will be found the names and addresses of those who have furnished reports to the Board, for the year ending Nov. 1, 1885.

The entire number of reports received was 1,670, and the average number received each week, about 100.

While this represents but a small number of the physicians in Ohio, the results gained, have not been without value.

It is not to be expected that reports will be received from every physician in the State, nor is it considered necessary, for the purpose for which they are collected.

It may be assumed, that the average practitioner will meet with the disease prevailing in his neighborhood oftener than with any other form of disease.

For instance, if in a place having ten physicians, reports could be had of the cases of disease, coming under the observation of but two of these, a fairly accurate statement could be made of the diseases prevailing there.

And so, reports from a comparatively small number of observers, properly situated, would give fairly correct returns of the diseases prevailing in the State.

As to the value of such returns, we beg leave to offer a quotation from the second report of the Royal Sanitary Commission, given by Dr. John S. Billings, in his article on the "Registration of Vital Statistics," in the report of the National Board of Health, 1882.

"However complete the registration of deaths may be, it cannot give a fair estimate of the grief and poverty occasioned by sickness that is not fatal; it can not indicate where or how these are to be prevented or remedied; it can not tell the cost which is worth incurring for their diminution.

"To these ends, the first step must be a registration, so far as may be practicable, of all the cases of the most prevalent and injurious sicknesses among such portions of the population as may suffice for an estimate of the general state of the public

health, and especially to keep the central sanitary authority constantly aware of the state of the public health in every part of the country.

"In nearly all cases of epidemic and contagious diseases time is lost before the deaths—few in comparison with the cases—begin to attract attention. In many instances, weeks have elapsed before the existence of widely prevalent and preventable disease has become known to any efficient sanitary authority.

"Thus the best opportunities are lost both of ascertaining the origin of epidemics and of preventing or limiting their spread. The chances of suppressing an outbreak of disease are in direct proportion to the speed with which it becomes known to a sanitary authority."

The importance of this work is greatly under-estimated.

In the endeavor to perfect the returns of deaths, the sickness which has occurred is forgotten. But the returns of the sicknesses of the State is the very *soul* of vital statistics—the death-returns but the dead body, which shows not what *can*, but what *should* have been done.

The weekly reports have already been found of value to the Board in locating dangerous communicable diseases.

In this way early intelligence has been received of cases of diphtheria, scarlet fever and typhoid fever, the existence of which the Board must have remained ignorant but for these reports.

Under the head of "Dissemination of information" will be shown the use of the knowledge so gained.

In August, letters were addressed to the secretaries of all the State Boards of Health, and also to the secretary of the National Board of Health, and of the Provincial Board of Ontario, asking a friendly recognition, and requesting copies of their annual reports, circulars, blank forms, etc.

Cordial replies were received in most instances, and a large number of valuable reports presented to the Board.

A few standard works have been purchased, but from want of space the founding of an adequate library for the use of the Board, has been deferred.

Very complete returns are being gathered of the meteorological observations made in Ohio.

Through the kindness of Sergeant McRae, of the Columbus Signal Station, a bulletin board was secured and placed in the rotunda of the State House. This is supplied with a daily weather report from Washington. In addition, three daily observations taken at the Columbus station are furnished the Board.

A communication to the Chief of the Signal Service, U. S. Army, requesting a monthly report of the observations taken at the stations in Ohio, received a prompt response.

Monthly reports of the Ohio Meteorological Bureau, embracing the observations of forty-one stations, are also furnished to the Board.

These reports are retained and filed for future reference, and will afford sufficient data for the study of atmospherical conditions as a cause of disease.

DISSEMINATION OF INFORMATION.

The dissemination of information has been carried on as follows:

In August a series of weekly health bulletins were commenced, based on the reports of diseases received from regular correspondents. The following is the bulletin for September, 1886:

Health Bulletin.

Reports to the Ohio State Board of Health from 96 observers (embracing 54 counties) show the following diseases to prevail for the week ending Saturday noon, September 25, 1886. (Last two columns of figures are for previous week, based on reports of 91 observers:

Form of disease in order of prevalence.	Number who report cases.	Number cases reported.	Number who report cases.	Number cases reported.
Diarrhoea	75	292	65	322
Malarial fever	74	248	65	203
Consumption	46	78	44	96
Diphtheria	30	104	32	71
Typhoid fever	30	44	31	46
Bronchitis, acute	24	38	18	28
Erysipelas	17	19	.....	.....
Pleurisy	17	22	12	14
Pneumonia	16	24	17	19
Whooping-cough	12	30	16	53
Croup	8	10	11	17
Scarlet fever	5	51	8	86
Measles	4	6	2	6
Cerebro-spinal meningitis	3	3	4	4

Total number of deaths reported from all causes 189, of which 90 were children under five years. Diarrhoeal troubles still prevail, but a marked decrease in the number of cases reported. Diphtheria is reported present in 20 counties. Reports from other sources show the disease to be widely prevailing in the State. Forty-seven cases of scarlet fever in Cincinnati. No deaths. Malarial fever still on the increase.

C. O. P. OBSR, M.D., *Secretary.*

As a slight return for the labor of making reports, copies of the bulletin are mailed, each week, to all correspondents. While this greatly increases the work of the office, it is believed that physicians will value these bulletins so highly, that they will not be willing to see them discontinued.

With a view of enlisting the interest of the public in the work of the Board and of securing a wide circulation of such items of general interest, as the location of contagious diseases, for instance, the following circular letter was mailed to editors of various newspapers throughout the State:

OFFICE OF SECRETARY OF STATE BOARD OF HEALTH,
COLUMBUS, OHIO, *Sept. 14, 1886.*

DEAR SIR: I have enclosed herewith our "*Weekly Bulletin*," issued every Tuesday. If you desire this as an item of news, I will take pleasure in mailing you a copy weekly. We desire to get these reports before the people, and believe they will be interesting to the reading public. In time they can be made most valuable as a means of indicating the localities in our State most liable to outbreaks of preventable diseases.

Enclosed please find an addressed postal, by which you can inform me of your wishes.

Respectfully,

C. O. PROBST, M. D., *Secretary.*

Nearly three hundred editors expressed a desire for the bulletin, and it is sent to them weekly. We take pleasure at this opportunity in publically returning thanks to those members of the medical profession and of the press, who have rendered such efficient aid in the work of the Board.

Perhaps the greatest benefit derived from the weekly reports, has been the information gained as to the localities in which diphtheria has prevailed.

During the past three months this disease has almost reached the extent of an epidemic in our State.

In September the following circular of instructions as to the best means to be employed for its restriction and prevention was issued:

DIPHTHERIA:

ITS

PREVENTION AND RESTRICTION. ISSUED BY THE STATE BOARD OF
HEALTH OF OHIO.

Diphtheria is often a most malignant and fatal disease, and each year causes many deaths in our State. For this reason, and that it is to a large extent, a preventable disease, the State Board of Health has issued this document, hoping to disseminate among the people such facts known about the disease, as may restrict its spread and prevent its occurrence.

Diphtheria is a contagious and infectious disease, and the strict observance of the following rules and precautions are urged upon all who may come in contact with it:

1. When a child has sore throat with fever, and especially when diphtheria is present in the neighborhood, it should be kept apart from others until a competent physician has determined it is not diphtheria.

2. When a person is known to be sick with diphtheria, he should immediately be

separated from all others, excepting his attendants, and removed to a room which should be specially prepared for his occupancy.

3. This room should be prepared by removing from it all superfluous furniture, carpets, extra clothing, books, window curtains, and all other similar articles, not needed in the room. It should be as remote as possible from the family rooms—preferably, in the upper story—and care should be taken to secure an abundance of fresh air, without exposing the patient to direct drafts.

4. A card with diphtheria on it in large, plain letters should be placed in a conspicuous position on the house in which there is a person sick with the disease. No child should be allowed to enter the house.

5. No one should be admitted to the sick room, except the necessary nurses and attendants.

6. No food or drink which has been in the sick room should be partaken of by the well. The dishes carried in should be washed separately.

7. Under no circumstances should the bed clothes or the patient's body linen be mixed with the other soiled clothing, or be admitted to the general wash, without being first thoroughly disinfected.

8. All persons recovering from diphtheria are dangerous, and should not be permitted to attend school, church, or any public assembly until, in the judgment of a careful physician, they are no longer a source of contagion.

9. No public funeral should be held of any person dying of diphtheria. In no case should any child be permitted to attend.

DISINFECTION.

When a case of diphtheria occurs, let the following disinfectant solutions be prepared at once :

SOLUTION No. 1.

Dissolve chloride of lime, of the best quality, in soft water, in the proportion of four ounces to the gallon.

SOLUTION No. 2.

Dissolve sulphate of iron (known also as copperas) in hot water, in the proportion of two pounds to the gallon.

*

RULES FOR DISINFECTION.

1. The discharges from the throat, mouth, and nose are exceedingly poisonous, and should be received on soft cloths, which must be immediately burned or immersed in Solution No. 1.

2. The discharges from the kidneys and bowels, and vomited matters are also dangerous, and should be received in a vessel containing Solution No. 1. Retain in the vessel fifteen minutes, when the contents may safely be thrown into the water closet or privy vault.

3. The soiled clothing, bed linen, towels, etc., should at once, before being carried

*It has been demonstrated that copperas is not properly a disinfectant. It is an excellent antiseptic, arresting putrefactive decomposition, but does not destroy the vitality of disease germs or the infecting power of material containing them. Hence it must not be substituted for Solutions No. 1 or No. 3.

from the sick room, be placed in boiling water and boiled for thirty minutes. If, for any reason, this cannot be done, they may be soaked in the following solution :

SOLUTION No. 3.

Dissolve corrosive sublimate in hot water, in the proportion of two ounces to the gallon. Label poison, and keep in a wooden or earthen vessel.

Take two fluid ounces, or a half-teacupful of this solution to one gallon of water, and let the articles to be disinfected be thoroughly soaked in this, remaining immersed at least two hours ; they may then be wrung out and sent to the wash.

4. The body of a person who has died of diphtheria should be washed with Solution No. 1 and wrapped in a sheet wet with the same. The body should be buried at once and in no case should be exposed to view.

5. After death or recovery of the sick, the room, furniture, and other contents not to be destroyed, must be thoroughly disinfected.

a. It is best to burn all articles which have been in contact with the person. Those too valuable to destroy, may be treated as follows :

b. All articles which can be washed may be treated according to Rule 3, under Disinfection.

c. Clothing and bedding which cannot be washed may be disinfected by exposure to dry heat for three or four hours. A temperature of 230° Fah. must be maintained during this time, and the articles freely exposed, *i. e.*, not folded or arranged in piles or bundles.

7. The room and all articles in it, which cannot be treated by either of the above methods, must be thoroughly fumigated.

a. The contents of the room should be so arranged as to expose the greatest amount of surface to the action of the disinfectant. Heavy woolen clothing, silks, furs, stuffed bed covers and similar articles, should be hung up in the room and pockets turned inside out. Pillows, mattresses, upholstered furniture, etc., must be cut open and the contents spread out for fumigation. Carpets are best fumigated on the floor. After fumigation, these articles must all be hung in the open air and thoroughly beaten and shaken.

8. To disinfect a room by fumigation, proceed as follows :

a. Close the apartment as completely as possible, stopping all openings through which the gas might escape. Thoroughly dampen the floor, walls, and furniture.

b. For a room about ten feet square, take three pounds of sulphur, broken into small fragments. For larger rooms, use a proportionately larger amount of sulphur. Put it into an iron pan, and to avoid danger from fire, support the pan on bricks, placed in a tub containing a few inches of water. Moisten the sulphur with alcohol and set on fire, being careful not to breathe the fumes of the burning sulphur. When certain the sulphur is burning well, leave the room, close the door, and allow the room to be tightly closed for several hours.

c. Open all the windows and air the room thoroughly for several hours. If the walls and ceiling are papered, remove the paper and burn it. The floor, walls, ceiling, wooden furniture, etc., should be thoroughly washed with a solution made by adding two pints of Solution No. 3 to four gallons of water. Allow this to remain on for twenty-four hours, and then scrub thoroughly with soap and hot water.

9. The house and premises generally should be put in the cleanest condition possible, and every means taken to secure pure air and pure drinking water.

10. Cellars, privies, cess-pools, water-closets, drains, sewers, etc., should be frequently and liberally treated with Solution No. 2.

The foregoing methods of disinfection are applicable in all contagious diseases.

If Solution No. 1 is objectionable on account of the odor of the chloride of lime, an equally efficient disinfectant, to be used in the same way, may be made by adding one pint of Solution No. 3 to one gallon of water. It is necessary to leave it a longer time—at least an hour—in contact with the material to be disinfected.

Label all solutions of corrosive sublimate, *poison*.

PREVENTIVE MEASURES.

1. Avoid the contagium of the disease. Especially should children be guarded against contact with anything which has been near one sick with the disease.

2. Be careful of books, toys, cats and dogs which may have been handled by a diphtheria patient.

3. If any one visits such a case, he should bathe, disinfect and change his clothing before going where there are children.

4. Beware of any one with a sore throat; do not kiss such a person, or drink from the same cup, or put anything into your mouth he may have handled.

5. When diphtheria is present in your neighborhood, beware of taking children to crowded assemblies in unventilated rooms.

6. See that your house, cellar, and yard are kept perfectly clean, and your living and sleeping rooms are well ventilated.

Cleanliness, pure air, and pure water are the three great foes of this disease.

To the public these rules may seem numerous and, perhaps, unimportant, but the State Board of Health would not be doing its whole duty if it failed to point out the best possible means known of restricting and preventing this dread disease.

In order that this document may do the greatest possible amount of good, it is hoped that all who receive it will aid by helping to disseminate widely the suggestions it contains.

Should a case of diphtheria occur near you, you can do yourself and your community great good by seeing that the family have one of these pamphlets.

A copy of this document will be furnished to any one on application to the Secretary of the State Board of Health, Columbus, Ohio.

Copies of this circular were sent to correspondents reporting diphtheria in their practice, and the following circular letter was enclosed:

OFFICE OF THE SECRETARY STATE BOARD OF HEALTH, COLUMBUS, OHIO.

DEAR SIR: Your last report shows diphtheria to be present in your neighborhood.

I have taken the liberty of sending you copies of our circular on diphtheria, intended for distribution among the laity. If these instructions will aid you in preventing the spread of the disease, I will immediately send you, on application, any number of copies you may require for distribution. Should the disease threaten to

become epidemic in your community, I would respectfully advise giving a copy of this circular to your city and county papers, urging them to publish it in the interest of the health of the people.

We are preparing circulars on other contagious and infectious diseases, of which you can procure copies.

Respectfully,

C. O. PROBST, M. D., *Secretary*.

In addition, copies were mailed to a large number of newspapers, and especially to those published in counties where the disease was known to prevail. The following circular letter to editors, was inclosed :

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,
COLUMBUS, OHIO.

DEAR SIR: Reports from our regular correspondents indicate the prevalence of *Diphtheria* in our State, to an alarming extent. Unfortunately the people do not recognize the serious nature of the disease, or the great importance of strict sanitary measures in preventing its spread. In cases of death, public funerals are frequently held, affording every opportunity of spreading the disease.

The people are slow to understand that this disease is of far more importance here—owing to its frequency—than either small-pox or cholera.

Hoping to disseminate correct views relative to the management of this dread disease, our Board has issued for distribution, a circular on the subject. I take the liberty of sending you a copy, trusting the public press will aid us in the great work of preventive medicine.

Respectfully,

C. O. PROBST, M. D., *Secretary*.

A large number of letters have been received from physicians, and from men and women of all classes of society, requesting copies of the circular.

Twenty five thousand of these have been printed, and, as the disease continues to prevail in many places, and is usually found to be more prevalent during the cold months, they are being freely distributed.

Following the circular on diphtheria, was issued one on the prevention and restriction of scarlet fever. This was printed in the form of an eight page pamphlet, as follows :

SCARLET FEVER:

ITS

RESTRICTION AND PREVENTION. ISSUED BY THE OHIO STATE BOARD
OF HEALTH.

Scarlet Fever, also called Scarlatina, Scarlet Rash, Canker Rash, etc., is a dangerous, contagious disease, of far more importance in our State, owing to its frequency, than either small-pox or cholera.

The contagium or poison of scarlet fever surpasses that of any other eruptive fever, except small-pox, in its tenacious attachment to objects and its portability to distant localities.

The poison may retain its infecting properties for months unless destroyed by proper disinfection.

It usually attacks children under ten years of age, hence the great importance of preventing children from being exposed to the disease. The latest evidence indicates that scarlet fever never originates from any telluric or atmospheric influence, but is always due to a specific principle or contagium: In other words, scarlet fever can only occur by infection from a pre-existing case of the same disease. Countries have been free from it for centuries till imported by commerce. In view of this fact, the great importance of isolation, quarantine and disinfection in preventing the spread of the disease, is beyond question. From want of proper precautions in this respect, it not infrequently happens that scarlet fever will attack successively a large family of children. It is believed that by the strict observance of the following rules and regulations this disease may be greatly restricted in our State:

1. When a child has a sore throat and fever, and especially when scarlet fever is present in the neighborhood, it should immediately be separated from others until a physician has seen it, and determined whether it has scarlet fever.

2. When a person is known to be sick with this disease, no matter how light the attack may appear to be, he should immediately be separated from all others excepting his attendants, and removed to a room specially prepared for his occupancy.

3. This room should be prepared by removing from it all superfluous furniture, carpets, extra clothing, books, etc.; in short, everything not absolutely needed for the comfort of the sick, or the convenience of the attendants. All closets connecting with the room should have everything removed from them.

4. The room should be large, preferably in upper story, and as far removed from the family rooms as possible.

5. The best means for disinfecting a sick-room is to secure an abundance of fresh air. The patient, however, must not be exposed to direct drafts, and this can be avoided by fitting beneath the lower window-sash a strip of board a few inches in width.

6. Other children of the family, not affected, may be sent to some place where there are no children, or others liable to take the disease; but their clothing should have had no contact with the patient, or should be disinfected, and they should remain apart from the public for a period of two weeks.

7. Friends should not be allowed to visit the patient, and no one should be admitted to the sick-room except the nurse and necessary attendants. No child must be allowed to enter the house.

8. A card with "Scarlet Fever" on it should be placed in a conspicuous position on the house or premises in which there is a person sick with the disease.

9. The attendants should wear only such clothing as can be washed, and should keep themselves and their patients perfectly clean. Especially should they guard against allowing the discharges from the patient to remain on their hands, which should be frequently washed in a disinfectant solution.

10. Food or drink which has been in the sick-room should not be thrown in the swill-barrel; it should be cared for in the same manner as the discharges of the patient.

11. All cups, glasses, spoons, etc., used in the sick-room should be washed separate from the other dishes, and should remain some time in boiling water.

12. Towels, bed clothes, the patient's body linen, etc., should not be mixed with the other soiled clothing, or be admitted to the general wash without being first thoroughly disinfected.

13. All persons recovering from scarlet fever are dangerous, and should not be permitted to attend school, church, or other public assembly, nor allowed to play with other children. They are sources of contagion so long as any peeling or scaling of the skin continues, and must be kept secluded until this process is fully completed.

14. A public funeral must not be held of any one dying from this disease, and in no case should any child be permitted to attend. Newspaper notices of such deaths should distinctly state that the deceased died of scarlet fever.

DISINFECTION.

When a case of scarlet fever occurs, let the following disinfectant solutions be prepared at once:

SOLUTION No. 1.

Dissolve chloride of lime, of the best quality, in soft water, in the proportion of four ounces to the gallon.

*

SOLUTION No. 2.

Dissolve corrosive sublimate in hot water, in the proportion of two ounces to the gallon, and add one drachm of permanganate of potash to each gallon to give color to the solution.

1. The discharges from the throat, mouth and nose are extremely dangerous, and should be received on soft cloths (handkerchiefs should not be used) which must be immediately burned or immersed in Solution No. 1.

2. Vomited matters, discharges from the bowels, kidneys, eyes, ears and skin, are also dangerous, and should be treated as above, or be directly received in a vessel containing a pint or more of Solution No. 1. Retain in the vessel thirty minutes, when the contents may be thrown in the water-closet or privy vault.

3. The particles of skin thrown off from the patient's body are supposed to be frequent carriers of the contagium, and, unless countermanded by the physician, the body should be frequently anointed with vaseline, oil, etc., which prevents their dissemination.

4. The soiled clothing, bed linen, towels, etc., should at once be placed in boiling water and boiled thirty minutes. If this cannot be done in the sick-room, they should be placed immediately in a solution prepared by adding a half teacupful of Solution No. 2 to one gallon of water; or in the same proportion for larger quantities. Allow them to remain in the solution at least two hours; they may then be wrung out and sent to the laundry.

5. The body of a person who has died of scarlet fever should be washed with

* It has been demonstrated that copperas is not properly a *disinfectant*. It is an excellent antiseptic, arresting putrefactive decomposition, but does not destroy the vitality of disease germs or the infecting power of material containing them. Hence it must not be substituted for Solutions No. 1 or No. 3.

Solution No. 1 and wrapped in a sheet wet with the same. The body should be buried at once, and in no case should be exposed to view.

6. After death or recovery of the sick, the room, furniture, and other contents not to be destroyed, must be thoroughly disinfected.

a. It is best to burn all articles which have been in contact with the person. Those too valuable to destroy, may be treated as follows:

b. All articles which can be washed may be treated according to Rule 4, under disinfection.

7. The room and all articles in it, which cannot be treated by either of the above methods, must be thoroughly fumigated.

a. The contents of the room should be so arranged as to expose the greatest amount of surface to the action of the disinfectant. Heavy woolen clothing, silks, furs, stuffed bed covers and similar articles, should be hung up in the room and pockets turned inside out. Pillows, mattresses, upholstered furniture, etc., must be cut open and the contents spread out for fumigation. Carpets are best fumigated on the floor. After fumigation, these articles must all be hung in the open air and thoroughly beaten and shaken.

8. To disinfect a room by fumigation, proceed as follows:

a. Close the apartment as completely as possible, stopping all openings through which the gas might escape. Thoroughly dampen the floor, walls and furniture.

b. For a room about ten feet square, take three pounds of sulphur, broken into small fragments. For larger rooms, use a proportionately larger amount of sulphur. Put it into an iron pan, and to avoid danger from fire, support the pan on bricks, placed in a tub containing a few inches of water. Moisten the sulphur with alcohol and set on fire, being careful not to breathe the fumes of the burning sulphur. When certain the sulphur is burning well, leave the room, close the door, and allow the room to be tightly closed for several hours.

8. Open all the windows and air the room thoroughly for several hours. If the walls and ceiling are papered, remove the paper and burn it. The floors, walls, ceiling, wooden furniture, etc., should be thoroughly washed with a solution made by adding two pints of Solution No. 2 to four gallons of water. Allow this to remain on for twenty-four hours, and then scrub thoroughly with soap and hot water.

9. The room should be thoroughly aired for several days, and children kept out of it as long as possible. The house and premises generally should be put in the cleanest possible condition.

The foregoing methods of disinfection are applicable in all contagious diseases.

If Solution No. 1 is objectionable on account of the odor of chloride of lime, an equally efficient disinfectant, to be used in the same way, may be made by adding one pint of Solution No. 2 to one gallon of water. It is necessary to leave it a longer time—at least an hour—in contact with the material to be disinfected.

Label all solutions of corrosive sublimate *poison*. *

PREVENTIVE MEASURES.

1. Avoid the contagium of the disease. Especially should children be prevented from going near a case of scarlet fever, or from coming in contact with anything which has been near one sick with this disease.

*It should be remembered that solutions of corrosive sublimate will injure lead pipes if passed through them in large quantities.

2. Be careful of books, toys, cats and dogs which may have been handled by a scarlet fever patient. The disease has been spread by circulating libraries; picture books having been taken therefrom to amuse the patient, and returned without being disinfected.

3. One recovering from the disease should not be permitted to mingle with the public until he and his clothing have been thoroughly cleaned and disinfected.

4. No child coming from a house containing a case of scarlet fever, should be allowed to attend school or other public assembly, and should be prevented from playing with other children.

5. Any one coming from such a house should bathe, disinfect and change his clothing before going where there are children.

6. Beware of any one with a sore throat; do not allow your children to be kissed by such a person, or to drink from the same cup.

7. When scarlet fever is present in your community, do not take children to crowded assemblies in unventilated rooms.

8. See that your house and premises are perfectly clean. Look to your cellars, sewers, cess-pools, sinks and water closets, and allow no decaying animal or vegetable matter to poison the atmosphere of your dwelling.

To those who fail to appreciate the serious nature of this disease, these rules may seem numerous, and, perhaps, unimportant. Prevention is better than cure, and the State Board of Health has presented the best possible means known of restricting and preventing the spread of scarlet fever.

It is hoped that all who may receive this document will not only make such use of it as will tend to disseminate most widely the suggestions it contains, but will also act for the restriction and prevention of scarlet fever in accordance therewith.

Should a case of scarlet fever occur near you, you can do yourself and your community great good by seeing that the family have one of these pamphlets.

A copy of this document will be furnished to any one on application to the Secretary of the State Board of Health, Columbus, Ohio.

Fortunately, scarlet fever, as indicated by reports, is limited to a few localities of the State, but as an important feature of the Board's work will be the prevention of disease, it is considered a wise precaution to place these in as many homes as possible.

Twenty thousand copies have been printed and are being distributed in the same manner adopted for the circulation of that on diphtheria.

In October, the following circular on typhoid fever was prepared. It was remarked years ago by an eminent physician, that the presence of typhoid fever in a community should be regarded as a crime for which somebody should be responsible. Certain it is that this disease can more readily be controlled than any other with which sanitarians have to deal.

Twenty thousand copies have just been issued, and as this disease is now increasing in prevalence, it is hoped the circulation of this pamphlet may, in some measure, aid in restricting it:

TYPHOID FEVER:

ITS

RESTRICTION AND PREVENTION. ISSUED BY THE STATE BOARD OF
HEALTH OF OHIO.

Typhoid Fever, sometimes called "Enteric Fever," "Fall Fever," etc., is a common disease of frequent occurrence in our State.

It is especially a disease of young adult life, although no age is exempt from it. It attacks all classes of society, being found both in the mansion and in the hovel. It is probably the most preventable of all infectious diseases, excepting, perhaps, small-pox, since the introduction of general vaccination. In view of this fact, and that it is the cause of so much sickness and death in the State, it is hoped the following instructions for its restriction and prevention will be carefully considered and followed by all who may receive this document:

MODE OF COMMUNICATION.

Typhoid fever is believed to be due to a specific cause, a disease germ given off by one sick with the disease, and which may be transmitted to others in various ways. The poison is usually received by drinking water contaminated by discharges from the bowels of a typhoid fever patient.

This generally comes from throwing these discharges into privy vaults or faulty sewers which allow their contents to filter through the ground into a neighboring well or spring.

It has been demonstrated that impurities may thus be carried through porous soils for distances of one hundred feet and more.

Severe outbreaks of typhoid fever have occurred in cities from the discharges having been thrown into the river from which the city derived its water supply.

In some instances the disease is so mild that the patient never goes to bed, and may be even unaware of the nature of his malady. His discharges, however, are fully as dangerous as in more serious cases, and unless properly cared for, may be the cause of many other cases of the disease.

Milk has frequently conveyed the disease, either from being diluted with water containing the typhoid fever poison, or by being kept in a room in which there is one sick with this disease; in the latter case the disease germs are absorbed by the milk. It may be conveyed by the clothing, especially by such as have received discharges of the patient. Laundresses, in washing such clothing, have thus the contracted the disease.

In some instances the poison seems to gain access to the system by breathing it in; and the gasses from a faulty or untrapped sewer, which has received the discharges of a typhoid fever patient, may convey the disease. It is possible the poison may be found in other discharges, but it is in the stools of a typhoid fever patient that the special cause of this disease is usually found.

It is not believed that filth of itself will cause the disease, but it serves as a nidus

(nest) in which the specific germ of the disease lodges, lives and multiplies. Typhoid fever is communicable, but is not considered contagious.

The foregoing outline of the nature of the disease, and the manner of its communication, will suggest the measures to be taken for its prevention.

It is of the first importance that the stools of every person suffering with typhoid fever be thoroughly disinfected and placed where they can not possibly gain access to the source of any drinking water. In cities having sewers, they may, after disinfection, be thrown into the water-closet, but they should not be thrown into unsewered privy vaults, but be buried in trenches dug in the ground remote from any water supply.

All discharges from the bowels should be received in a vessel containing a quart or more of the following solution and allowed to remain therein for at least thirty minutes.

DISINFECTANTS.

SOLUTION No. 1.

Dissolve chloride of lime, of the best quality, in soft water, in the proportion of four ounces to the gallon.

If the patient is unable to use a vessel, receive the discharges on soft rags or paper and burn them at once. All clothing or bedding soiled by the patient's discharges, must be removed at once and placed in boiling water to be boiled for half an hour; or they may be immersed in the following solution, allowing them to remain for two hours, when they may be wrung out and sent to the laundry; to be thoroughly boiled.

SOLUTION No. 2.

Dissolve four ounces of sulphate of zinc (white vitriol) and two ounces of common salt, in one gallon of water.

(It would be better to boil the soiled clothes, towels, etc., in this solution.)

Nurses and attendants should observe perfect cleanliness, and their hands should be frequently bathed in solution No. 2. Their meals should be prepared and eaten in a room separate from the patient's.

Typhoid fever is not supposed to be contagious, *i.e.*, not transmitted directly from one person to another, hence the strict isolation of one sick with the disease is not necessary, but needless visits of friends should be discouraged.

The body of one dead from this disease should be wrapped in a sheet saturated with solution No. 1 or No. 2, made double strength, and be buried as soon as possible.

After death, or recovery from the disease, the room which the patient has occupied, with all its contents, should be exposed to the fumes of burning sulphur. To fumigate a room proceed as follows:

Arrange the contents of the room so as to expose the greatest possible amount of surface to the action of the disinfectant. Clothing, bed covers, and similar articles should be hung up in the room. Close the room as completely as possible, stopping all openings through which the gas might escape. Leave open the doors of communicating closets. For a room about ten feet square, take three pounds of sulphur, broken into small fragments; for larger rooms use a proportionately larger amount. Place it in an iron pan, and to avoid danger from fire, support the pan on bricks placed in a tub containing a few inches of water. Moisten the sulphur with alcohol

and set it afire, being careful not to breathe the fumes of the burning sulphur. When certain the sulphur is burning well, leave the room, close the door, and allow the room to be tightly closed for twenty-four hours. Afterwards it must be thoroughly aired, and should not be used for several days.

Immediately on the appearance of typhoid fever, a careful examination should be made of the surroundings of the house, and particularly of the source of the water supply, to determine, if possible, whether it has been contaminated by a neighboring privy, sewer or other source of filth. If good reason is found to suspect such contamination, the well or spring should be boarded over, and the water not be used until an examination has been made by a competent physician or health officer.*

If the sick person has not been away from home, where the disease might have been contracted, it will be safest that the water in use by him immediately before having been taken sick, should not be used again for drinking or culinary purposes, unless it is boiled. It would be well, also, to boil the milk used by the family.

The house and premises should be thoroughly cleaned, all decaying animal and vegetable matter removed, and sinks, cess-pools, privies, etc., be treated with a solution of copperas—two pounds of copperas to one gallon of water.

This circular is issued for distribution among the people, and a copy will be sent to any one on application to the Secretary of the State Board of Health, Columbus, Ohio.

In August a circular letter was addressed to the physicians of Ohio, endeavoring to secure their co-operation in the work of the Board, and urging the necessity of local health Boards for effective public sanitation.

The following is a copy of this letter :

THE OHIO STATE BOARD OF HEALTH,
COLUMBUS, OHIO, August, 1886.

DEAR DOCTOR : The medical profession is to be congratulated upon the important advance made in the establishment of a *State Board of Health*. This legislation is the result of prolonged and persistent endeavor. The results of the work of such Boards in other States, have demonstrated their eminent usefulness; and we are confident, that in the near future, the Department of State or Preventive Medicine will become one of the most important factors in State Government.

The extent of the immediate benefit of the Board will largely depend upon the willing and faithful co-operation of the medical profession. Certainly, there can be no doubt of a hearty response from men, whose business in life is the relief of human suffering, and who are always foremost in benevolent and philanthropical movements.

We respectfully direct your attention to the enclosed copy of the law under which we exist, and would especially recommend to your close consideration the 4th section of the same. The value of *Vital Statistics* is conceded by all, the only mooted point being the best method for their collection. We believe, that with a small effort on the part of each physician, we will be able to solve the problem. The Board

*It is the opinion of the best authority that wells in thickly settled districts are nearly always unfit for use, and that in cities having other water supply they should be entirely abandoned.

will be glad to furnish you with all the necessary forms which will enable you to do the work with greatest facility.

It is hoped that local boards will be organized all over the State; the work can thus be systematized and made more effective. Each corporate community will be the direct recipient of the benefits of public sanitation.

The power to organize such boards is vested in the town councils: (See Revised Statutes of Ohio, Sec. 1692, 24.)

We will be pleased to promptly attend to all correspondence concerning matters pertaining to the public health, and render all assistance in our power to advance this great work. By order of the Board.

Very respectfully,

C. O. PROBST, M. D., *Secretary*.

About four thousand copies of this letter were mailed, and a copy of the act creating the Board enclosed with each. ♦

The letter was answered by a large number of physicians, many of whom were enlisted as regular correspondents of the Board.

LETTERS FROM CORRESPONDENTS.

A large number of letters have been received and answered. The following have been selected as being of sufficient interest to warrant publication:

BUCYRUS, OHIO, September 25, 1886.

Dr. C. O. Probst—DEAR SIR: I have thought it might be of some interest to you, and I might introduce matters, by giving you a note or two in regard to our town.

We have rarely any typhoid fever—have not seen a case in town for several years—no scarlet fever for sixteen or seventeen years, and but few cases then. Had four or five years ago, an endemic or epidemic of measels, which took the town generally, but with very little mortality. Small-pox, *nil*.

Why all this is so, I do not know, as we can not be said to be particularly strong, on drainage, etc., rather the opposite, since we have a stream running through the town, which has become positively an open sewer, receiving much more than half of the town sewerage.

As to diphtheria, we have from three to a half dozen cases, happening at intervals of several months, while, during the twenty-five years that I have been here, there have been periods of several years when there were (at least in my practice) no cases at all. I had, all told, eight cases in the first nineteen years here, but it has appeared several times in the past nine months. There were here, last January, about twelve or fourteen cases, nearly one-half fatal, one in my own practice ending by a series of paralyzes—last one invading respiratory apparatus.

Was called last Sunday to see a boy aged eight years, who had had it for twenty-four hours previously—rather profuse exudation on tonsils and neighboring parts—by Wednesday further extension of it. Thursday morning noticed slight laryngeal symptoms—well marked by Friday morning, and death sometime last night. Case might be termed malignant.

If this hurried scrawl will be of any service to you, I shall be amply repaid for the few minutes spent in writing. Should we have further cases, I will advise you.

Yours, etc.,

GEO. KELLER, M. D.

KINSMAN, OHIO, October 25, 1886.

Secretary, State Board of Health—DEAR SIR: Malignant diphtheria is prevailing in a locality near here.

The cases may have been reported, but I think not. A married lady of twenty-eight died suddenly; reported to have quinsy. No 2 died after a weeks' sickness, aged eighteen, a sister of No. 1.

No. 3 laid out No. 1, and was taken down in three days; said not to have diphtheria.

No. 4 took care of and assisted in laying out No. 2; reported to have diphtheria. No. 5 assisted No. 4 in caring for No. 2, and in laying her out; was taken down at same time with No. 4, is under my care; had diphtheria and is convalescing.

No 6, a child of No. 5; local symptoms better, but shows evidence of systemic poisoning. No. 7, a girl of twelve years, daughter of No. 4, is under my care; malignant diphtheria; will probably die.

No. 8, brother of No. 7, age fifteen; local symptoms; improving.

No. 9, child of No. 1, reported to have sore on the hand and sore throat, but not diphtheria.

The cases all occurred upon the banks of Sugar creek, usually a clear running stream, gravelly bottom; water now low; all in families of farmers, but with bad sanitary surroundings. Any suggestions thankfully received.

Yours, very truly,

ALLEN JONES, M. D.

UNIONPORT, JEFFERSON COUNTY, O., October 15, 1886.

C. O. Probst, M. D.—DEAR SIR: According to instructions in your circular, I write to inform you that a very malignant form of diphtheria has made its appearance here in my practice. It has only broken out in one family as yet, one of which died. Three of the others are improving rapidly, and are likely to recover; but I do not expect it to stop here.

The one that died was a child, two years old. The other three are young ladies.

Yours truly,

JOHN CAMERON, M. D.

P. S.—I see the Board has issued a pamphlet on diphtheria, please send me copies.
C.

MORROW, O., Sept. 22, 1886.

C. O. Probst, Secretary State Board of Health—DEAR DOCTOR: Copies of circulars to hand and distributed; they are the right thing in the right place for our town. Please send a dozen or two more. We have some new cases.

Very truly,

F. H. DARBY, M. D.

One case of small-pox was reported to the Board. The following letter was in answer to inquiries made concerning it:

GOMER, ALLEN COUNTY, O., June 10, 1886.

W. H. Cretcher, President Ohio State Board of Health, Bellefontaine, O.—DEAR SIR: In answer to your letter of inquiry of the 7th inst., would say: That on Monday morning, the 31st ult., I was called to visit a young man who had landed in New York from Liverpool, about the 10th of May, arriving in this neighborhood on the 21st.

The severity and character of the symptoms in this case, together with liabilities incurred in ocean passage, and the time transpired since his arrival, led me to suspect variola.

I at once notified the household of my apprehensions, who immediately left the premises, and the house was placed under quarantine.]

On the following day, my suspicions were strengthened by the statement of the patient that there were rumors of small-pox being on the vessel a few days before arriving, and by the fact, stated, that all on board were vaccinated before leaving the vessel.

(In answer to my question on the first day, whether there was any sickness on board, he misunderstood me, and said not.)

It soon became evident that it was a severe case of confluent variola, which terminated fatally on last evening. Every precaution has been, and is being taken to prevent the spread of the disease.

A lady friend accompanied him on his ocean voyage, and came here with him, and remained with him during his illness.

Both of them moved more or less freely among a few of the neighbors, before he was taken ill, and I cannot say how much infection may be developed from such contact. But would say that the few families with whom they most intimately mixed, previous to the development of the case, have been contented to remain at home and use every precaution not to spread the infection, if any attached to them.

Any further information you may at any time desire in regard to this case will be cheerfully given, and I will be very thankful for any instructions or suggestions you may favor me with in case there is further development of the disease.

Very respectfully,

R. E. JONES, M. D.

SIDNEY, OHIO, October 12, 1886.

To the Ohio State Board of Health—GENTLEMEN: From the fact that milk-sickness is almost a disease of the past, you may deem the following report worthy of record:

When this country was in a state of nature, milk-sickness was *very* common in the northern part of Shelby county, and it seems that the cause is not yet wholly eradicated, nor will it be, until the soil is all cultivated in these sections where the farmers fear to turn their stock during the summer and fall months, especially if a dry season.

In Franklin township, seven miles northeast of Sidney, and two miles southeast of Lima, on the excellent farm of Mr. C., about the first of August, 1886, one of the unweaned calves was attacked with trembles, the cattle at the time being on wild woods pasture, and the owner not knowing the danger. The calf recovered, and by changing the herd to tame pasture, the other cattle manifested no symptoms of the dread disease.

About the middle of August three members of the family were taken down with milk-sickness, (sick stomach.) A boy fourteen years of age, a young man twenty-one years, and a married lady twenty-five years of age.

The disease was well marked in all three cases, especially in the young man, he being confined to his room three weeks, after which, with proper precaution, he continued to improve until recovery was fully established.

The boy and lady were in bed about one week, soon after which they returned to work, only to be taken down at the end of two weeks with a more alarming type of

the same disease, due, undoubtedly, to over exertion, as fatigue is a prominent predisposing cause.

The symptoms were principally excessive nausea, vomiting, great prostration, and very offensive breath, peculiar to milk-sickness alone. Almost total arrest of the natural secretions and excretions, with a continual abnormal low bodily temperature, especially of the extremities; abdomen retracted, flabby, and comparatively empty; peristaltic motion seemed suspended. This apparent collapse lasted for about ten days, when the nausea and vomiting almost ceased, the bowels relaxed, and the boy recovered.

The lady died September 30, there being in her case an entire suspension of nutrition, though the stomach retained food, there was complete lack of assimilation. She died from inanition.

Notwithstanding writers of medical literature discredit this being a specific disease, the clinical history certainly entitles it to be classified with the infectious diseases, it having an incubative stage and being propagated by a specific poison.

Respectfully yours,

H. E. BEEBE, M. D.

PHILADELPHIA, Aug. 19, 1886.

Secretary State Board of Health—**DEAR SIR:** At a recent meeting of the State Board of Health of Pennsylvania, I, as chairman of the "Committee on Preventable Diseases and the supervision of Travel and Traffic," was instructed to address a communication to the secretaries of all State Boards of Health, inquiring what regulations, if any, exist in their several states, with regard to the transportation of corpses.

This information is desired with the view of bringing the matter before the National Conference of State Boards of Health at Toronto, in October.

An answer at your early convenience will greatly oblige,

Very truly yours,

JOSEPH F. EDWARDS, 224 South 16th St.

This letter introduces a subject of great importance to our State.

The law in Ohio governing the transportation of corpses, is as follows:

SEC. 2119. No person shall convey a corpse to or from any city without a permit from the board of health.

This provision is manifestly inadequate, since but a limited number of cities are provided with boards of health, while no provision is made for rural districts or for of bodies shipped to Ohio for burial from other States. Fortunately, our railroad corporations have taken a step in advance of the laws regulating such transportation. Inquiry at various offices of railroad companies, elicited the fact that their officials refused transportation to dead bodies unless accompanied by a certificate from the physician who had attended the deceased, certifying that death had not been due to any dangerous contagious disease.

This subject demands legislation, and every safe-guard should be taken to

prevent the possible introduction in this manner of pestilential and contagious diseases.

NUISANCES.

The attention of the Board has been called to a number of nuisances. When possible the facts in these cases were gathered by correspondence; in others, personal investigation was made by the Board.

In securing their abatement, it is necessary, in some instances, to resort to legal proceedings.

The delay necessitated in securing an indictment by grand jury will, in many cases, defeat the ends to be obtained. A nuisance which, in August, might endanger the health of a whole community, would, perhaps, by November, be entirely innocuous.

Ample power should be given the Board to act promptly in all such cases.

Special mention must be made of a nuisance which is being committed by the Capital city of our State. It introduces a subject of the greatest importance to all cities, *i. e.*, the disposal of their night soil and garbage.

The firm of King, Gilbert & Warner, of Columbus, O., reported a nuisance near their blast furnace, situated just beyond the city limits. On visiting this place a nuisance was found well deserving complaint.

In a small ravine, about two or three hundred yards south of the furnace, was being dumped the night soil and garbage of Columbus, and the bodies of animals dying within the city.

The stench arising from this place was something to be remembered. Just south of this place was another dumping ground, similar to the one mentioned, and in close juxtaposition was a hog-pen, which, if possible, was even more odoriferous than the dumping grounds.

The half consumed carcasses of putrifying animals were found lying around the pen. We were informed that the men working at night at the furnace—the time the dumping is done, were frequently made ill by the stench arising from these places.

The parties engaged in this business were notified to take immediate steps to abate the nuisance, and something has been done in this direction, but the nuisance still exists.

The city of Wheeling, W. Va., has lately conducted a series of experiments in disposing of its night soil and garbage by burning, and Columbus should be required to adopt this, or some other unobjectionable method for disposing of these noxious matters.

A full description of this crematory may be found in a subsequent part of this report, in a paper by Dr. H. J. Sharp, entitled: "Report on Water-sources, Sewerage, Drainage, and Disposal of Substances Injurious to Health."

SPECIAL REPORTS.

The following telegram was received October 12, 1886. As Dr. Wise, Chairman of the committee on Epidemic Diseases, etc., was unable to attend, it was forwarded to Dr. Miller, with the request that he would, if possible, make the necessary investigation :

TELEGRAM.

Typhoid fever of a malignant character is prevalent near East Rochester, on Cleveland & Pittsburg Railroad, Columbiana county. Several deaths have occurred, and there are now twenty or thirty cases. We will be there to-morrow. If possible, have State Board represented.

COMMISSIONERS OF COLUMBIANA CO.

The following embraces the results of Dr. Miller's investigation :

MASSILLON, O., October 19, 1886.

Dr. C. O. Probst—DEAR DOCTOR: I went to East Rochester on the 13th instant, to inquire into the causes and character of a disease which has prevailed near there for some time past. The afflicted neighborhood is about two miles east of East Rochester, on the Cleveland & Pittsburg Railroad.

In trying to elicit the features common to the several cases of sickness, I learned (1) that rather persistent vomiting, was present in all, or nearly all the cases, in some to such a degree as to render anything like systematic medication impossible.

(2) That all cases started off with pains in the front or back of the head, or both, severe in character.

(3) Generally, severe aching of the bones, chills, and temperature running as high as 104° to 105° F., with remissions, in some cases, every day, and in others, every alternate day, when the temperature would fall to 100° or 101° F. When the nausea had subsided (after a few days) the sick took almost any kind of nourishment fairly well.

(4) There was a prevalent tendency to constipation, though an occasional case had diarrhœa to a moderate extent.

(5) There was, as a rule, no delirium nor mental dullness, no tympany, no abdominal tenderness, (two cases were reported as being wildly delirious, one of which had opisthotonos); and a moderate degree of tympany was occasionally present. In most cases pain was complained of in the umbilical region. There was no eruption observed in any case. The cases usually ran a course of twelve to twenty-four days before convalescence set in.

Through the kindness of Dr. Waldron, I was permitted to examine a number of cases, most of which were improving. Two cases, however, seemed to be in the midst of the disease, ten or twelve days from its inception, with a temperature of 104°, dry, red tongue, in one moderate tympanites, but no diarrhœa in either.

One case was only four or five days advanced in the disease. This was a child two or three years of age, who, at the time of observation, had a moderate elevation of temperature, and was said to suffer somewhat from diarrhœa, which had troubled him at intervals since the hot weather. I was told this case had a higher temperature on the previous day, than at the time I saw him.

The houses occupied by the afflicted families, are on ground from twenty-five to

fifty feet higher than the surface of the water in the old canal. Their wells are thirteen to fourteen feet deep, and are {probably supplied by overflow from the upper surface of a stratum of fire-clay at its outcrop, a few rods higher up the hill; one well of special excellence, according to owner's view, has habitually nine inches of water. It is rapidly filled up during a rain, but speedily falls to its climax of excellence at nine inches. In almost all these cases the stables, pig-pens, etc., are a few rods higher on the hillside, and directly above the houses and wells, and in a few cases the droppings and refuse of many generations of domestic animals, have been allowed to accumulate, reeking in the sun and diffusing through the soil during every rain.

The old Beaver and Sandy canal, for a distance of about three-fourths of a mile, (covering pretty well the afflicted neighborhood) has but slight fall, and in many cases, the water stands at a depth of a foot or two, and its motion is further greatly impeded by a rank growth of vegetation. But for many years there has been a stream of water, even in the driest times, flowing pretty freely where the fall was sufficient and the impediments not too great. This canal seems to be the chief source of malaria in the neighborhood. The people along the north side of the valley near the canal, suffering more or less every year, while people living on the other side of the valley, one-eighth to one-quarter of a mile distant, rarely suffer at all from this cause, and are now free from the sickness which afflicts their neighbors near that portion of the canal in which the water was so sluggish.

Before the breaking out of the present epidemic, the water at the upper end of the canal already referred to, where the canal is almost on a level with the little creek, was turned out of the canal and into the creek, leaving the canal bed without sufficient water to maintain a flow, and exposing almost the entire section (three-quarters of a mile) with its mud, filth, and many years' accumulation of decomposing vegetable and animal matter to the sun, the water becoming so poisonous from evaporation and consequent concentration, as to destroy the fish.

At the time of my visit the best had been done that could be probably, by again turning the water into the canal.

There is, I think, no reason to doubt that the old canal bed is the chief nursery for malarial poison in that neighborhood, and I am convinced that unfit drinking water is an important factor in giving the prevailing sickness its serious and stubborn character.

I met the county commissioners of Columbiana county on the ground, who seemed anxious to be advised as to what they could do for the people. I recommended that one of two things ought to be done, (1st), *To fill up the whole section of the canal at fault, conducting all the water into the creek.* This would be done at great expense for ditching and filling, and would subject the valley to much more serious overflows than are likely to occur in the present condition of things, besides involving the important question as to who should do the work, as much of this part of the canal is not claimed nor owned by the abutting property owners, but is said to be owned by the defunct canal company.

It is probable, however, if the old ditch should be converted into valuable land, the abutting owner could be prevailed upon to annex it to their farms if they would not try to make good a claim that it properly belongs to them.

(2.) *That the canal bed be filled sufficiently to secure a proper grade for the water to flow off readily with no low places for stagnation, and a ditch made, as small as would be sufficient which should be kept open and clean.*

This method would be must less expensive, and would probably compromise agricultural interests to less extent than the method first suggested, and would also, I incline to think, be somewhat less effective. The legal complications could likely be unraveled if it should become necessary, by bringing the matter before the grand jury for an indictment as a nuisance; I have confidence that the courts could locate the ownership and responsibility at the same time.

I am greatly indebted to Dr. Waldron for information and assistance, as well as for an opportunity to examine a number of cases in the afflicted families.

Yours, very truly,

T. CLARKE MILLER, M. D.

A REPORT OF THE SANITARY CONDITION OF DAYTON, OHIO.

Dr. J. M. Weaver, health officer of Dayton, Ohio, has kindly furnished the following sanitary description of his city:

Dayton, the county seat of Montgomery county, is situated on both sides of the Miami river, at the junction of Stillwater and Mad rivers.

It is a city of 50,000 inhabitants, fully one-half of whom are Americans by birth, the remainder being German, Irish, a few Scotch, Italians and negroes. The city extends over a territory of about three and a half miles in length by two and a half in breadth. The ground upon which much of the city is built is within from three to five feet of the bed of the river, requiring a heavy embankment from overflow during high water, the newer portions occupy higher ground.

The Miami and Erie canal flows through the central portion of the city, and furnishes water power for many manufacturing establishments.

The geological formation underlying the site of the city is just a rich loam of some eighteen inches or two feet in depth, beneath which is gravel and sand varying in depth from five to fifty feet, and below this a "hard-pan" or stiff blue clay, thus affording good surface drainage, and rendering cellars and premises dry.

The city contains no system of sewerage; some of the buildings and premises on the higher grounds and in close proximity to the river drain into the same, but almost the entire sewage matter is run into cess-pools, which are dug in the ground.

Privy vaults are in general use, and not being cemented or rendered watertight, allow their liquid contents to percolate into the ground.

Night soil is disposed of by being dumped into the river at a point below the corporate limits of the city. Kitchen garbage, during the summer months, is regularly collected two or three times per week by the street commissioner and also dumped into the river below the city. During the winter months it is disposed of by burning, or in whatsoever manner individual housekeepers can do, much of it remaining on the ground until the advent of spring.

Water is supplied the city from wells driven through the hard-pan into the ground below; it is pumped directly into pipes, and distributed to all portions of the city. This water is abundant and of excellent quality, and is generally used. There are a few of the old-fashioned surface wells, but, except in the outskirts of the city, the water they contain is impure, containing large amounts of organic matter, and have for this reason been largely abandoned.

Although this city is practically without sewerage, it is one of the healthiest if not *the healthiest* city of its size in the United States.

The following table shows the comparative mortality for the past ten years, the average being 14.97 per thousand inhabitants.

The prevailing diseases are those of the State generally and have not especially changed in character in a series of years, except that there is a greater prevalence, perhaps, of zymotic and malarial troubles.

COMPARATIVE MORTALITY, DAYTON, O., FOR TEN YEARS.

Annual Death Rate.

Years.	Estimated population.	Death rate per 1,000.	Total deaths.	Zymotic.	Constitutional.	Local.	Developmental.	Violence.
1876.....	36,000	14.47	521	121	130	189	50	31
1877.....	37,000	12.32	457	60	104	192	72	29
1878.....	37,500	13.46	504	91	107	197	85	24
1879.....	37,654	14.31	539	126	122	194	73	24
1880.....	38,677	14.86	575	129	128	209	78	31
1881.....	39,000	19.23	750	220	161	268	67	34
1882.....	41,000	15.51	636	146	132	275	37	46
1883.....	45,000	15.40	693	187	145	249	68	48
1884.....	47,000	15.21	715	166	146	284	94	25
1885.....	48,000	14.35	689	120	140	296	107	26
Total.....	405,831	14.97	6,079	1,366	1,315	2,353	641	318

INTER-STATE NOTIFICATION IN INFECTIOUS AND CONTAGIOUS DISEASES.

The following resolutions presented by the National Conference of State Boards of Health, were adopted by the American Public Health Association at Toronto, October 8, 1886.

WHEREAS, It is necessary for the protection and preservation of the public health that prompt information should be given of the existence of cholera, yellow fever and small-pox, be it

1. *Resolved*, That it is the sense of the National Conference of State Boards of Health that it is the duty of each State, provincial and local board of health in any locality in which said diseases may at any time occur, to furnish immediately information of the existence of each disease to boards of health of neighboring and provincial States, and to the local board in such States as have no State board.

2. *Resolved*, That upon rumor or report of the existence of pestilential disease, and positive definite information thereon not being obtainable from the proper health authorities, this Conference recommends that the health officials of one State shall be privileged and justified to go into another State for the purpose of investigating and establishing the truth or falsity of such reports.

3. *Resolved*, That whenever practicable, the investigations made under the preceding section, shall be done with the co-operation of the State or local health authorities.

4. *Resolved*, That any case which presents symptoms seriously suspicious of one of the aforementioned diseases, shall be treated as suspicious, and reported as provided for in cases announced as actual.

5. *Resolved*, That any case respecting which reputable and experienced physicians disagree as to whether the disease is or is not pestilential, shall be reported as suspicious.

6. *Resolved*, That any case respecting which, efforts are made to conceal its existence, full history and true nature, shall be deemed suspicious, and so acted upon.

7. *Resolved*, That in accordance with the provisions of the foregoing resolutions, the boards of health of the United States and Canada represented at this Conference do pledge themselves to an interchange of information as herein provided.

IRVING A. WATSON, *Secretary*,
American Public Health Association.

The importance of the above agreement in protecting our State against invasion by pestilential diseases, will be readily seen, early notification, allowing of strict inspection of passengers and merchandise from infected regions.

VITAL STATISTICS.

The laws governing the collection of Vital Statistics in this State, are as follows: [Revised Statutes.]

SECTION 2116. The board of health may * * * create a complete and accurate system of registration of births, marriages, deaths and interments, occurring in such corporation, for the purpose of legal and genealogical investigation, and to furnish facts for statistical, scientific, and particularly for sanitary inquiries * * *

SEC. 2117. In cities of the first grade, of the first class, which, for this purpose alone shall be co-extensive with the county, it shall be the duty of physicians and professional mid-wives to keep a registry of the several births at which they have assisted professionally, which registry shall contain the time of such birth, sex, and color of the child, and the names and residence of the parents. Clergymen and other persons authorized to solemnize marriages, shall keep a registry of all marriages solemnized by them; physicians who have attended deceased persons in their last illness, and undertakers and sextons who have buried deceased persons, shall keep a registry of the name and age of such persons, and their residence at the time of their death, and all such physicians, professional mid-wives, clergymen, and all persons authorized to solemnize marriages, undertakers, and sextons, shall report to the board of health all births, marriages, and deaths occurring within the limits of such city, as registered by them, which reports shall be made as often as the board of health may require.

SEC. 6391. A certificate of every marriage hereafter solemnized, whether authorized by publication of bans in the congregation, or by license issued by a probate judge, or after notice given to the congregation, signed by the justice or minister solemnizing the same, or the clerk of the monthly meeting, shall be transmitted to the probate judge in the county wherein the marriage license was issued, or the congregation wherein said bans were published is situated, or marriage was celebrated within three months thereafter, and recorded by such probate judge; every justice, or minister or clerk of the monthly meeting, failing to transmit such certificate to the probate judge in due time, shall forfeit and pay fifty dollars; and if the probate judge shall neglect to make such record he shall forfeit and pay fifty dollars to and for the use of the county.

SECTION 6395. The probate judge shall keep a record of the births and deaths reported to him as hereinafter provided; the births shall be numbered, recorded, and alphabetically indexed in the order in which they are received, and the record shall state, in separate columns, the date of making the record, the date and place of birth, the name, sex, and color of the child, the maiden name of the mother, and the name of the father of the child, and the residence of the parents, as fully as the same are reported; the deaths should be likewise numbered, recorded, and indexed, and the record thereof shall state in separate columns, so far as the same is reported, the date and place of death, name and surname of the deceased, condition (whether single, married, or widowed), age, place of birth, occupation, names of parents (when an infant without name), cause of death, color, and last place of residence of such deceased person, and the date of making the record.

SEC. 6396. It shall be the duty of the assessors of the several townships and wards of each county of this state, to obtain, annually, the foregoing statistics, at the time

each assessor shall make the assessment of his respective township or ward for the year ending the last of March preceding each annual assessment, and report the same to the probate judge of his county, at the time of his regular report to the (county) auditor; and at the time of submitting his report to the probate judge, he shall state upon oath that he has made diligent inquiry in order to obtain the number of births and deaths, and other information required by this chapter, in his township or ward, respectively; and if any assessor in this state shall fail or refuse to make such report, or to make and file the affidavit required by this title, the auditor of his county shall withhold his order until the law has been complied with, to the satisfaction of the probate judge, except in counties containing cities of the first class, having a population of one hundred and fifty thousand and over, in which counties it shall be the duty of the physicians and professional midwives to keep a registry of the several births in which they have assisted professionally, which shall contain, as near as the same can be ascertained, the time of such birth, sex, color of the child, the names and residence of the parents; and physicians who have attended deceased persons in their last illness, clergymen who have officiated at the funeral, and sextons who have buried deceased persons, shall keep a registry of the name, age, and residence of such deceased persons at the time of their death; it shall be the duty of the physicians and professional midwives to report fully the births registered by them, as required by this chapter, to the judge of the probate court of the county, every three months, viz., on or before the second Monday of the months of January, April, July and October of each year; in case there is no physician or midwife in attendance at any birth, then the parents shall be required to report to the probate judge within one month; and physicians, clergymen, and sextons shall likewise report fully the deaths registered by them, as required by this chapter, to the judge of the probate court of the county, every three months as above designated; and any person who shall neglect or refuse to comply with, or violate the provisions of this chapter, shall forfeit and pay for each offense the sum of ten dollars, to be sued for and recovered in the name of the state of Ohio, and the penalty, when recovered, shall be paid over, one-half to the school fund, and one-half to the party making complaint thereof.

SEC. 6397. It shall be the duty of the probate judge, to furnish to each assessor of the several townships or wards of his county, annually, and to other persons making such report, a sufficient number of properly ruled blanks, which shall be paid for out of the county treasury, upon which to make such report to said probate judge.

SEC. 6398. It shall be the duty of the probate judge, receiving the reports as above specified, within fifteen days after the receipts thereof, to record the same in a book to be provided by the commissioners for that purpose, and to transmit an abstract thereof, on or before the first Monday of August, every year, to the secretary of state, in such form as shall be prescribed by that officer, who shall file the same in his office, to be used by him in his annual report to the legislature.

SEC. 6399. Every original entry, made as above prescribed, and a copy of such entry duly certified over the seal of said court, shall be received in all courts and places as *prima facie* evidence of the facts therein stated, and said records shall be open to the inspection of the public at all proper hours.

Section 3, of an act to create and establish a State Board of Health in the State of Ohio, is as follows:

“The Board of Health shall have supervision of the State system of registration of births and deaths as hereinafter provided; they shall make up such forms and

recommend such legislation as shall be deemed necessary for the thorough registration of vital and mortuary statistics throughout the State. The Secretary of the Board shall be the superintendent of such registration. The clerical duties and the safe-keeping of the Bureau of Vital Statistics thus created, shall be provided by the Secretary of State.

DEATHS.

In Ohio Statistics for 1885, it is stated that the reports of the health officers of Cincinnati and Cleveland, for that year, return a larger number of births and deaths in these cities than was returned by the Probate Judges of Hamilton and Cuyahoga counties, for the entire counties, including the cities.

This is a startling fact, and when it is considered that Ohio has for thirty years endeavored to collect these returns, the unsatisfactory results obtained, evince beyond question, a faulty method of collection.

At present, though the assessor should conscientiously endeavor to perform his duties, it must be that his returns will be very incomplete. His visits being made annually, many families necessarily escape his observation.

But there are other more valid objections to the present plan, the objects for which such returns are gathered being in a great measure lost.

One of the most important questions to be answered by a collection of mortuary statistics, is the causes of diseases, but to draw correct conclusions from the death reports, the cause of death must be accurately reported.

The present method is open to the greatest inaccuracies in this respect.

The family report to the assessor the cause of death, gathered often from the general remarks rather than from any expressed opinion of the attending physician.

The physician may purposely conceal from the family the real cause of death, as when from syphilis, alcoholism, etc.

In most cases the *immediate* cause of death is given, and this may give no idea whatever as to the original disease.

The total number of deaths reported in Ohio for the year ending March 31, 1885, was 35,912. This would give an average death rate in the State of about ten per thousand.

The registration report of New Hampshire for 1884, gives the death rate in that State as 17.85 per thousand, which is believed to be nearly correct. The death report of Massachusetts shows their death rate for 1885 to have been 19.61 per thousand.

The death rate in Cincinnati in 1885, was 18.37 per thousand, while that of Cleveland was 17.43.

Assuming the death rate of the State to have been fifteen per thousand, (a low estimate) from seventeen to eighteen thousand deaths occurred in Ohio in 1885, which were not reported.

BIRTHS.

The number of births reported in Ohio statistics for 1885, was 71,725, which is evidently much nearer a correct return.

It will be seen that the number of births reported is almost double the number of deaths.

It is hardly probable the population of the State is increasing so rapidly. Although the return of births, as given above, indicates a birth rate of from nineteen to twenty per thousand, it is certain this is too low.

As stated in the last report of the Secretary of State, the number of births reported by the health officers of Cincinnati, exceed the number returned by the Probate Judge of Hamilton county, for the entire county.

And yet the last report of the Cincinnati health department deplores the fact of being unable to collect all the births of their city.

If other counties present the same inaccuracy, and it may be safely assumed that they do, a very large number of births must occur which are never recorded. Something more than a correct numerical collection of births, however, should be attempted.

It is often of the utmost importance to establish the identity of an individual, and a birth record should place this beyond question.

If a record of birth were required as a proof of legitimacy, it is probable that few would go unrecorded.

MARRIAGES.

The total number of marriages reported in Ohio Statistics in 1885, was 28,773. This would give an average of about eight per thousand inhabitants. As compared with other States : In 1883 Connecticut gives a marriage rate of 8.5 per thousand ; Indiana 9.3 ; Iowa 15 ; while Massachusetts, for thirty years ending 1885, gives a marriage rate of 9.07 per thousand.

The marriages returned in Ohio are probably not greatly below the actual number. The record of a marriage, however, should be more complete, and should fix beyond question, the identity of the contracting parties.

It was remarked years ago, by an eminent authority, that many people of middle age would be unable to establish the fact of their parents' marriage.

This, no doubt, is the case even to-day. It is hoped that such changes will be made in the registration, as will insure a correct return of the births, marriages and deaths in Ohio.

THE COLLECTION OF DEATHS.

The greatest difficulty seems to be the securing of correct death returns. This will probably not be accomplished until some statutory provision is made for the burial of dead bodies. A dead body should in a manner become the property of the State, to be disposed of in such way as the State may provide.

By the present method of allowing bodies to be interred without question, concealment of crime is rendered easy, and thus far encouraged.

The cause of death is reported to the assessor, it may be a year after burial, when the facts in the case are perhaps unobtainable.

It is of the first importance that a law be enacted requiring a burial permit for the interment of every dead body within the State. The permit should be obtainable only from an authorized person, who, before granting the same, should demand and record all the facts required in connection with the death.

The item of greatest importance from a sanitary point of view is the cause of death. This, with rare exceptions, should be given by a physician. No other person is competent to certify to this fact, and when possible, it should be required before a burial permit is granted, and the immediate and remote cause should be given and so worded that the original disease may be known.

This certificate should be required of the physician who last attended the deceased. Where no physician has been in attendance the nearest of kin should obtain from a reputable physician, a certificate as to the probable cause of death, and in such cases if there be no kin, the undertaker or other person conducting the burial should be empowered to obtain this certificate at the expense of the county in which the death has occurred. In cases of death in which a coroner's inquest is held, the medical examiner should give the death certificate.

In exceptional cases the physician's certificate as to the cause of death might be accepted after burial.

Statements as to sex, age, color, birth place, etc., could be made by the undertaker, nearest of kin, or the householder, and should not be required of the physician.

Burial permits could be issued by town clerks, township clerks or justices of the peace. In cities having boards of health, the clerk of the board could be so empowered.

Probate judges could collect returns from these officers and forward them to the Secretary of State as heretofore.

If it were made unlawful for ministers to conduct funeral or burial services without having first been shown this burial permit, it would act as an efficient check on undertakers and others illegally interring dead bodies.

EXPENSES OF THE BOARD.

The following is an itemized statement of all disbursements from the State Treasury on account of the State Board of Health, as per vouchers number one to thirty-seven, inclusive:

Date.	No. of voucher.	To whom paid.	Amount.
1886.			
July 6	1	Myers Bros.— Printing, postal cards and voucher-book	\$18 57
6	2	D. H. Beckwith— Expenses as member of Board ..	62 40
6	3	W. H. Cretcher— Expenses as member of Board	74 30
6	4	John D. Jones— Expenses as member of Board	96 00
6	5	S. P. Wise— Expenses as member of Board	68 50
6	6	T. C. Hoover— Expenses as member of Board	45 35
6	7	H. J. Sharp— Expenses as member of Board	74 00
6	8	T. C. Miller— Expenses as member of Board	75 00
6	9	G. B. Case (Secretary)— Expressage and postage	37 75
28	10	T. C. Hoover— Expenses as member of Board	13 00
28	11	T. C. Miller— Expenses as member of Board	27 04
28	12	S. P. Wise— Expenses as member of Board	54 84
28	13	H. J. Sharp— Expenses as member of Board	65 55
28	14	W. H. Cretcher— Expenses as member of Board	25 50
28	15	W. J. Morgan & Co.— Stationery and lithographing	76 50
Aug. 23	16	C. O. Probst, Secretary— Postage and expressage	19 00
27	17	J. A. Kohler, Attorney-General— Expenses as member of Board	25 00
Sept. 7	18	C. O. Probst, Secretary— Postage	8 00
13	19	C. O. Probst, Secretary— Postage	40 00
20	20	C. O. Probst, Secretary— Postage	5 55
22	21	C. O. Probst, Secretary— Postage	8 00
25	22	C. O. Probst, Secretary— Postage	33 30

EXPENSES OF THE BOARD—Continued.

Date.	No. of voucher.	To whom paid.	Amount.
1886.			
Oct. 20	23	C. O. Probst, Secretary	
		Postage	\$65 00
20	24	F. W. Schaub—	
		Messenger for three months.....	15 00
21	25	W. H. Cretcher, M. D.—	
		Expenses as member of Board.....	42 85
21	26	T. C. Miller—	
		Expenses as member of Board.....	43 00
21	27	H. J. Sharp—	
		Expenses as member of Board.....	31 50
21	28	D. H. Beckwith—	
		Expenses as member of Board.....	34 60
21	29	T. C. Hoover—	
		Expenses as member of Board.....	16 50
21	30	S. P. Wise—	
		Expenses as member of Board.....	28 00
20	31	Prof. C. C. Howard—	
		Chemical analyses	35 00
20	32	A. H. Smythe—	
		Books	10 66
		Stationery.....	9 40
		Sundries	3 75
20	33	Myers Bros.—	
		Printing	135 18
20	34	C. O. Probst, Secretary—	
		Salary.....	377 66
		Expenses of trip to Toronto	37 40
		“ “ Chillicothe	4 25
		Telegrams and scrap book.....	4 15
		Subscription to Conference of State Boards of Health	5 00
22	35	J. A. Kohler, Attorney-General—	
		Expenses as member of Board.....	15 25
22	36	Will J. Hudson—	
		Cyclostyle printing	50 50
22	37	Ohio Furniture Co.—	
		Desk and chair	49 00
		Total	\$1,966 81

The liabilities of the State Board of Health, October 31, 1886, were about \$540.00.

PROPERTY OF THE BOARD.

The property belonging to the Board and now in use in the office is embraced in the following list:

- One office desk.
- One office chair.
- One cyclostyle.
- One letter-book.
- One pocket-map of Ohio.
- One record book.
- One voucher book.
- One cash book.
- One ruler.
- One eraser.
- One ink-well.
- One scrap book.
- One desk pad.
- One knife eraser.
- One spirit lamp.
- Two correspondent books.
- 22,000 circulars on Diphtheria.
- 23,300 circulars on Scarlet Fever.
- 18,000 circulars on Typhoid Fever.
- One dozen letter press sheets.

STATIONERY AND POSTAGE.

- 3,000 small envelopes.
- 2,500 large envelopes.
- 2,350 one cent stamps.
- 720 two cent stamps.
- 375 postal cards.
- 2,860 paper wrappers.

CATALOGUE OF BOOKS AND PAMPHLETS.

REPORTS OF STATE BOARDS OF HEALTH.

Michigan—1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885.
California—1880, 1881, 1882, 1883, 1884, 1885.
Wisconsin—1876, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885.
Connecticut—1883, 1884, 1885.
New Hampshire—1884.
Maine—1885.
New York—1881, 1882, 1883, 1884, 1885.
Indiana—1881, 1882, 1884, 1885.
Iowa—1881, 1883, 1885.
West Virginia—1881, 1882, 1883, 1884.
Tennessee—1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884.
Illinois—1880, 1881, 1882, 1885.
“ —Report of Proceedings, (4 copies.)
“ —Register of Physicians and Midwives—2 vols.
Pennsylvania—1885.
“ —Report of Proceedings, (1 copy.)
New Jersey—1879, 1884.
Rhode Island—1880, 1882, 1883, 1884, 1885.
Kansas—1885.

NATIONAL BOARD OF HEALTH.

Reports for 1879, 1880, 1881, 1882, 1883, 1884, 1885.
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ANNUAL ADDRESS

OF

W. H. CRETCHER, M.D.,

President of the State Board of Health.

DELIVERED IN COLUMBUS, OCT. 19, 1886.



ANNUAL ADDRESS OF W. H. CRETCHER, M. D., PRESIDENT OF THE STATE BOARD OF HEALTH.

GENTLEMEN : The subject which I have selected for my address is the one which has been the burthen of my thoughts while performing the duties of a member of the State Board of Health during the past summer. The more I reflected, and the greater my observation and experience, the more thoroughly I became convinced of the inefficacy of *voluntary* aid in practically operating a State Board of Health.

Our Board has worked faithfully ; our Secretary has been vigilant and industrious, as his reports will show ; we have used every means we could devise, to arouse public interest ; circulars on postal cards have been sent to every post office within the State ; every physician has been addressed ; appeals have been made to sanitary and medical societies of Ohio ; health officers, and in fact *everybody* that we could think of who could aid us, or who would be interested in sanitary matters have been appealed to, and whilst hundreds have responded—and to all of them we return thanks—yet the reports do not represent the entire State.

Probably not more than three-fourths of all the counties of the State have reported at all—and possibly not more than three or four points in a county reporting have been heard from, and even those reports depending as they do entirely on voluntary aid, are irregular and unsatisfactory.

Although I believe the Secretary and Board have accomplished all that could have been accomplished under the circumstances, yet the work has been, and must be incomplete and unsatisfactory while depending so completely upon voluntary aid, and contribution for the *material* composing reports.

While I have given the subject much careful thought, I do not profess to fully solve and answer the following questions, embraced in the title of my subject :

What is the object of a State Board of Health ?

What considerations are necessary for its practical adaptability to the entire State ?

What results may be expected, or what benefits are to be derived from it ?

What is the object, or what is required of a State Board of Health ?

First—It is to obtain all information relating to the sanitary condition of the State, including vital and mortuary statistics.

Second—After receiving information to *act* upon it, and do all that lies within the power of the Board to *prevent* all classes of diseases that are preventable; to restrain and control all diseases that are contagious and epidemic, and confine them within the narrowest possible limits.

Third—To *correctly* collect, and preserve on record, the vital and mortuary statistics of the entire State.

Now, these divisions of our subject appear to be few, plain and simple in the abstract. But in the absence of necessary law, compulsory aid and precedent, in our State, for a Board of seven members with a Secretary—limited to five meetings, each meeting not to exceed three days, to satisfactorily perform all the duties implied in these divisions for the great State of Ohio, with an area of over forty thousand square miles, and a population of nearly, if not quite four millions, is simply an impossibility.

If it is practically an impossibility, under existing circumstances, for the State Board of Health to perform the duties already expressed, the question arises: "Is it possible, by aid of an additional number of health officers, the enacting of more and better laws, and by adopting a proper system of organization, to do this work in a thorough and efficient manner?" And if so, how?

To the first question I answer yes. The second I will attempt to explain. Before proceeding further I will remark that the *last* sanitary enactment of the Legislature should have been the *first*. I refer to the act creating the State Board of Health. But it is better, perhaps, that it should be the last than not at all. But, if the Board had been created first, it would have discovered that which is lacking, and recommended laws necessary to enable it to do the work assigned, and, if granted—of which I have no doubt—to-day we would find the Ohio State Board of Health abreast with the *best* sanitary organizations.

All sanitary laws contained in the Statutes of Ohio were enacted prior to and without reference to the act creating the State Board of Health.

With no desire to criticise their wisdom and purpose, and admitting the necessity of continuing most, if not all of them, I maintain they are not sufficient to wholly meet the wants and necessities of the Board to enable it to organize so as to include the entire State, and so systematise their work that every portion of the State may be represented. A reference to section 2117 and 2119 O. R. S. is sufficient to prove the truth of my assertions.

Section 2117 reads:

SEC. 2117. In cities of the first grade, which, for this purpose alone, shall be co-extensive with the county, it shall be the duty of physicians and professional midwives to keep a registry of the several births at which they have assisted professionally, which registry shall contain the time of such birth, sex, and color of the child, and the names and residence of the parents. Clergymen and other persons authorized to solemnize marriages, shall keep a registry of all marriages solemnized by them physicians who have attended deceased persons in their last illness, and undertakers

and sextons who have buried deceased persons, shall keep a registry of the name and age of such persons, and their residence at the time of their death; and all such physicians, professional midwives, clergymen, and all persons authorized to solemnize marriages, undertakers and sextons, shall report to the board of health all births, marriages and deaths occurring within the limits of such city, as registered by them, which reports shall be made as often as the board of health may require. (71 v. 159, § 306.)

And section 2119 reads:

SEC. 2119. No person shall convey a corpse to or from any city, without a permit from the board of health. (71 v. 159, sec. 307.)

Now, can one point out the reason why it is more important to the *State of Ohio* to have a careful and correct record of vital and mortuary statistics in Cincinnati than all the remainder of the State? If it be necessary (of which there can be no doubt) to make such a registry, why should it not be equally necessary for the balance of the State to do the same? Or, why is the task of making reports imposed on the clergymen, physicians and midwives of Cincinnati to the exclusion of clergymen, physicians and midwives in other parts of the State? Or why, as in section 2119 is it more dangerous to "convey a corpse to or from any city," than to convey a corpse to or from any town, village, or anywhere else, except from the residence or church to the cemetery? Briefly why should not the whole State be equally protected from the dangers of conveying or transporting dead bodies?

But, I repeat what I have said before, it is not so much my purpose to criticise existing sanitary laws as it is to recommend subjects for future legislation. I now respectfully submit the following propositions as fundamental to the practical adaptability to the people, and the equal operation and enforcement of all sanitary laws throughout every portion of the State.

AFTER THE STATE BOARD OF HEALTH.

I would recommend: *First*—An act creating an office in every county (where one does not now exist) to be filled by a salaried officer to be known and designated as the "county health officer."

Second—Making it *compulsory* for every chartered village, town, and city within the State to continually maintain each a local board of health, with a clerk for the same.

Third—In townships which cannot conveniently be included within the jurisdiction of a village, town, or city, it should become the additional duty of the township trustees of said township, together with the township clerk, to act, when necessary, as a local board of health, in the township where they hold office.

Fourth—All sanitary laws, rules and regulations that are general to the State,

should be equally applicable to townships, and township trustees acting as local boards of health.

It should be further provided that every person practicing medicine or midwifery, should be required to register in the office of the county health officer his full name, post office address, and the school of medicine which he practices.

Also, that every undertaker should register his full name, or the name of his firm, in the office of the county health officer, of the county in which his shop or store is situated.

The law should also make it compulsory for every person practicing medicine or midwifery, to report *every birth* which he professionally attends, and the *death of every person* whom he may professionally attend in his last illness.

Undertakers who may be called upon to bury persons who have suddenly died, unattended by a physician, or bodies upon which a coroner's inquest has not been held, should be required to report said death, with the cause as nearly as can be ascertained. If a coroner has held an inquest, then the verdict of the coroner, as to the cause of death, should be appended to the undertaker's report.

As it is now required of the secretary of the State Board of Health to obtain the list of marriages from the Secretary of State, as returned to him by the probate judges of the counties, I think that the clergy and all others who solemnize marriages, should report each marriage to the county health office. I believe the office of the county health officer should be considered as an office of record, and the books thereof as a part of the county records. Therefore I think that the county health officer should be the proper officer to grant marriage licenses. But if, for reasons that I do not know, the granting of marriage licenses should still be considered the duty of the probate judge of the county, I would still insist that the reports of marriages should be made to the county health officer by those who perform the ceremony.

Having defined the number of health officers and local boards, and recommended some new laws, and a few amendments to old ones, I will now proceed to explain more particularly how the health officers, local boards, and professional people should perform their various duties, and make their reports. The law defining and governing local boards might remain very much as it is, except as recommended, that all cities, towns and villages be compelled to create and perpetually maintain each a local board of health, and that it be the additional duty of township trustees, when necessary, or when demanded by three or more respectable citizens of the township in which the township trustees hold office, to act as a local board of health.

Clerks of local boards, and township clerks, should be the local correspondents of the county health officer, and it should be their duty to answer all in-

quiries of that officer pertaining to public health in the localities where they hold office.

Section 2136, O. R. S., should be so amended that the clerks of local boards of health should be required to send a copy of the annual reports to the county health office; and it should be further amended so that the time of making such annual reports would be changed from on or before the first Monday in March, to on or before the first Monday in September, which gives the county health officer time to use them in his report to the Secretary of the State Board of Health, who will also have time to incorporate them into the annual report of the State Board of Health, which must be submitted to the Governor on or before the first day of November, each year.

THE COUNTY HEALTH OFFICER AND HIS OFFICE

He should follow no other vocation and should receive a salary, graded in proportion to the population of the county in which he holds office. A suitable room should be furnished him in the court house of the county, with furniture, desk, books and stationery necessary to perform the duties of his office with safety and convenience.

HIS QUALIFICATIONS AND DUTIES.

He should be a resident of the county, and elected as a county officer. The term of office should not be less than three years. He should be in a good state of health, a graduate of some reputable medical college, and before offering himself as a candidate, he should be examined and receive a certificate from the State Board of Health, as to his knowledge of the following sciences, so far as they relate to public medicine: A knowledge of chemistry, so that he can make a qualitative and quantitative analysis of water; a knowledge of plumbing, that will enable him to pronounce whether or not it is faulty and dangerous to health; a knowledge of architecture, sufficient to pronounce with truthfulness upon the hygienic principles with which all public buildings within the county are constructed, with reference to light, heat and ventilation. He should possess sufficient knowledge of civil engineering to give proper advice on sewers, drains and streams, so far as they affect public health, and to be able to draft small, plain maps and charts of infected localities. When a large territory is to be explained by particular and more expensive drawings, he should be authorized to employ the services of the county surveyor.

HIS DUTIES.

He should keep constant surveillance over the sanitary condition of the county, and furnish the necessary blanks to all persons who are required to make

reports to his office. Having the register in his office of all persons required to make reports, it is his *duty* to see that *all* fulfill the requirements; and if they do not, it will be *his duty to enforce the penalty* for such neglect.

From these reports, and, if necessary, by inquiries directed to any physician on the register, or any clerk of local township or board, he may obtain information concerning any epidemic or contagious disease that may be prevailing in the county; and, if he thinks advisable, or his presence is requested by the local board where such epidemic or contagion prevails, he can visit the locality and give such advice as he may deem necessary, and also secure all the particulars requisite to making a satisfactory report. And, if required, he *must* assist the authorities by making analysis of water, inspecting buildings, sewerage, drains, streams, etc.

He should supply local boards with copies of circulars to be circulated at the beginning or during the prevalence of epidemics. Local boards should buy or have printed the necessary circulars. He should, so far as possible, become familiar with the geography and topography of his county, acquire an accurate knowledge of the social condition, occupations and nationalities of the people, and cultivate a cordial relationship between himself and the clerks of the boards who are his correspondents, and the physicians, midwives and clergymen, who contribute the material for the vital and mortuary statistics.

Finally, he should correctly make and neatly preserve that part of the county record committed to his care, and from these records make such report as may be required by the Secretary of the State Board of Health.

For the purpose of organization, the clerks of the local boards should be made subordinate to the county health officer, and all of the county health officers subordinate to the Secretary of the State Board of Health. The secretary of the State Board should furnish the forms and styles of all blanks, and the county should pay for them, but the style should be uniform throughout the State.

As far as convenience will admit, blanks for vital and mortuary statistics should be printed on postal cards, and each county health officer should print his own name and address on those he sends out to supply his corresponding physicians, midwives, clerks, etc.

The blanks for births should be divided into columns with "headings"—alive, dead, male, female, white, black, legitimate, illegitimate, nationality of parents.

Blanks for deaths should have headings, as age, sex, color, social condition, married, single, widow, widower, nationality, cause of death.

The Secretary of the State Board of Health should furnish books of record and other stationery in uniform styles; each county should pay its own expense for stationery.

When blanks can not be conveniently printed on postal cards, then stamped envelopes should be furnished with the blanks.

Thus arranged, it would be but little trouble for all who are required to make their reports, to do so without expense to themselves; and, having the address of the health officer thereon, these envelopes could be used for no other purpose.

RESULTS AND BENEFITS TO BE DERIVED FROM SUCH SYSTEM AND ORGANIZATION.

First.—We will have a system that can *compel* the greatest perfection in registering vital and mortuary statistics. It will take the place of a system that at present is worse than no system at all. The present system is so imperfect, that for all purposes to which it is applied, either county, State or national, it misleads.

For, from error, facts can never be derived. But with a true system, every county may have a perfect record of vital and mortuary statistics, and from the counties the State can make a true record, and from the State adopting this method the National Government can give a true representation in statistics founded on facts. These statistics, when correct, can be applied to so many purposes, that it would occupy a space greater than is intended for this address to fully describe.

I will mention but a few. They will be invaluable in many cases of a legal character. They would undoubtedly be used as public records in evidence in county, State, and United States courts in all legal disputes, involving questions of birth, as to time and circumstances, such as heritage, legitimacy or illegitimacy of children and the right of suffrage because of age, or nativity. And, as American citizens, and especially Ohio men, are to be found in all parts of the earth, where they might demand the protection of our government, as has frequently occurred, we could prove by our records, whether or not they were born here, if they so claimed, and whether or not they were entitled to our protection. Again, a person after many years' absence, returns home, his identity has been lost; he may have a right in an estate which is disputed, and such evidence as the records would afford would establish his right, or prove him an impostor. Either way the rightful heir would be protected, and given possession of his property.

MORTUARY RECORDS WOULD LESSEN CRIME.

If we had a law applicable to all parts of the State, similar to the law which now exists in some of our cities, regulating burials, the opportunities to hide a murder would not be as convenient, and that fact doubtless would lessen the temptation to do murder, because of the difficulty in disposing of the body.

But our business is more particularly to show the results and benefits to sanitary or public medicine. The county health officer, with weekly reports coming in from every physician, midwife, coroner and undertaker, will know the exact sanitary condition of the whole county. He needs no other way to be informed if there be a contagious disease or epidemic prevailing in any part of his county. His reports will show him not only where it is, what it is, but also the exact mortality. If he requires further information he knows whom to write to—the clerks of local boards, or the attending physicians. He has their addresses; and they know it to be their duty to furnish him with any information regarding sanitary matters in their respective localities. And further, they know it is their privilege to require any aid that the health officer, in his official capacity, can grant. And both of these authorities together can certainly do great good in stamping out, controlling and confining to narrow limits, any contagious or epidemic diseases, that are not wholly due to atmospheric causes.

From these weekly reports all of the county health officers of the State should be required, on a certain day of the week, to transmit correct and condensed reports to the Secretary of the State Board of Health, together with any short comment they wish to make on the prevalency of any disease in their respective counties.

From the reports of eighty-eight county health officers, arriving at a certain time in the week, the Secretary of the State Board of Health could issue the "Weekly Sanitary Bulletin," similar in character to the one first used in this State by our Secretary, C. O. Probst, M. D., which would be far more correct and comprehensive, and fully reflect the true sanitary condition of the entire State.

Every disease, in its order of prevalency, would be mentioned, together with the mortality of each, its geographical location, and extent of area infected.

These Bulletins, whilst occupying but small space in our newspapers, (not more, perhaps, than is devoted to daily weather reports,) would contain volumes of information.

They would also very much increase the value of the daily reports of the Weather Bureau. The two Bulletins being published together, valuable deductions could be made with certainty upon the influence of the different changes of the weather upon different diseases, and their effect at different seasons of the year. As, year after year, records were made, not only in this State, but, as we hope, in every State in the Union, scientists, physicians and sanitarians could prove the truth or fallacy of any proposition or deductions drawn from these statistics.

Shaded charts*, the difference in intensity of shading showing the maximum, medium and minimum degree with which a certain disease prevails over a certain area, or areas of the State, could easily be published with the weekly Health Bulletin, so that at a glance any reader of newspapers could obtain a satisfactory and comprehensive idea of the extent to which any epidemic or contagion was prevailing in the State at the time.

Finally, the labors of the local boards of the State, and their annual reports, which the law now requires them to make; the sanitary work of all the physicians, midwives, undertakers and coroners, and the weekly and annual reports of the health officers of the eighty-eight counties of the State would furnish material for the Secretary of the State Board of Health with which to compile the Sanitary History of the State for the year. Such a volume would be valuable to scientists, political economists, physicians, and public sanitarians, not only for every State in the Union, but for every civilized government in the world. The information it contained would not only be varied and comprehensive in character, but far better still—be founded on truth.

Another advantage these volumes would possess over the majority of the books of the present is, their value would increase with age. They would not only be worth far more than their cost to the present generation, but their value to future generations would be inestimable. The proportion of the increase of the population by birth to that by immigration, could be exactly ascertained. The increase or decrease of the mortality in certain localities and districts could be definitely told, and also the cause of such changes.

Localities which are now miasmatic and unhealthy, but by proper cleaning, ditching and draining were rendered healthy, would testify to the benefits to be derived from public records. Conversely, public records would show that, whereas certain localities and regions that were once *healthy* had been rendered very *unhealthy* by artificial means—by man's utter disregard of the laws of health. As witnessed by public record, the effects of certain manufacturing establishments, the pollution of streams, densely populated districts with deficient sewerage, defective plumbing, crowded tenement houses, private cess-pools, and like receptacles in too close proximity to wells, etc., etc.

By this system we could correctly estimate the number of deaths from all causes per thousand inhabitants, which would enable us to compare our death rate with other states and nations. Then again, we could ascertain the ratio of deaths from each particular cause or disease, as compared with the whole number of deaths. Then, by comparing one county or region with another, and by the use of the shaded charts before alluded to, we could easily discover

*To Dr. John S. Billings, of the U. S. A., I am indebted for this last idea, viz.: illustrating the extent and intensity of disease by shaded charts. He gave a fine illustration by four shaded charts, in his published address, delivered before the British Medical Association at Brighton, England, in August of the current year.

what particular diseases were epidemic to the localities, and with this knowledge in view, do whatever was possible to reduce the mortality from these indigenous causes. Many diseases that are hereditary are made more fatal by the location in which the individuals live who possess such hereditary tendencies. This fact is well illustrated by the charts referred to in the address of Dr. John S. Billings.

Here areas are shown in which consumption is 75 per cent. of all deaths from all causes. Other areas of country show the ratio to be all the way from 75 cent. to 15 per cent., the minimum.

Another chart shows that cancer (considered an hereditary disease), has its *maximum* mortality in all the New England States, and its *minimum* somewhere west of the Mississippi river, and, strange as it may appear, the shaded chart shows that cancer is more prevalent in Indiana than it is in Ohio.

Now, you may ask, "What benefits are to be derived from such knowledge?" I will answer: By this measure people will be educated on these points in public medicine, newspaper readers will be informed by these bulletins and charts where the areas are that mark the maximum of certain diseases, and where the areas of the minimum are to be found.‡

Then, an individual, knowing himself or his family to have a "taint" of an hereditary disease, and also that he is living in a region where the disease prevails at its maximum, will undoubtedly remove to the locality where the disease is known to be at its minimum in mortality.

By the emigration of people with known hereditary tendency to a particular disease from the place of its maximum prevalence, not only are their lives prolonged, but if not done too late the disease may be in time obliterated from such families, if they be particular in their marriages, and continue to live in a country where the disease least prevails.

Then again, by emigration, and the avoidance by people having an hereditary tendency to a particular disease of the region of its maximum mortality, together with the sanitary improvements which it is possible to make, that region or district, which was once stigmatized as being the place of maximum mortality for that disease, might, in the course of time, be made to mark medium, if not minimum, in mortality.

Truly, "health is wealth," and the Michigan State Board Health did wisely when they made it their motto.

I wish that writers on political economy would devote a larger space in their works to the principle expressed in this motto.

How truthfully John Ruskin has written: "The strength of a nation is in its multitude, not in its territory; but only in its sound multitude. And it has been the madness of economists to seek for gold instead of life."

The results may be briefly expressed—

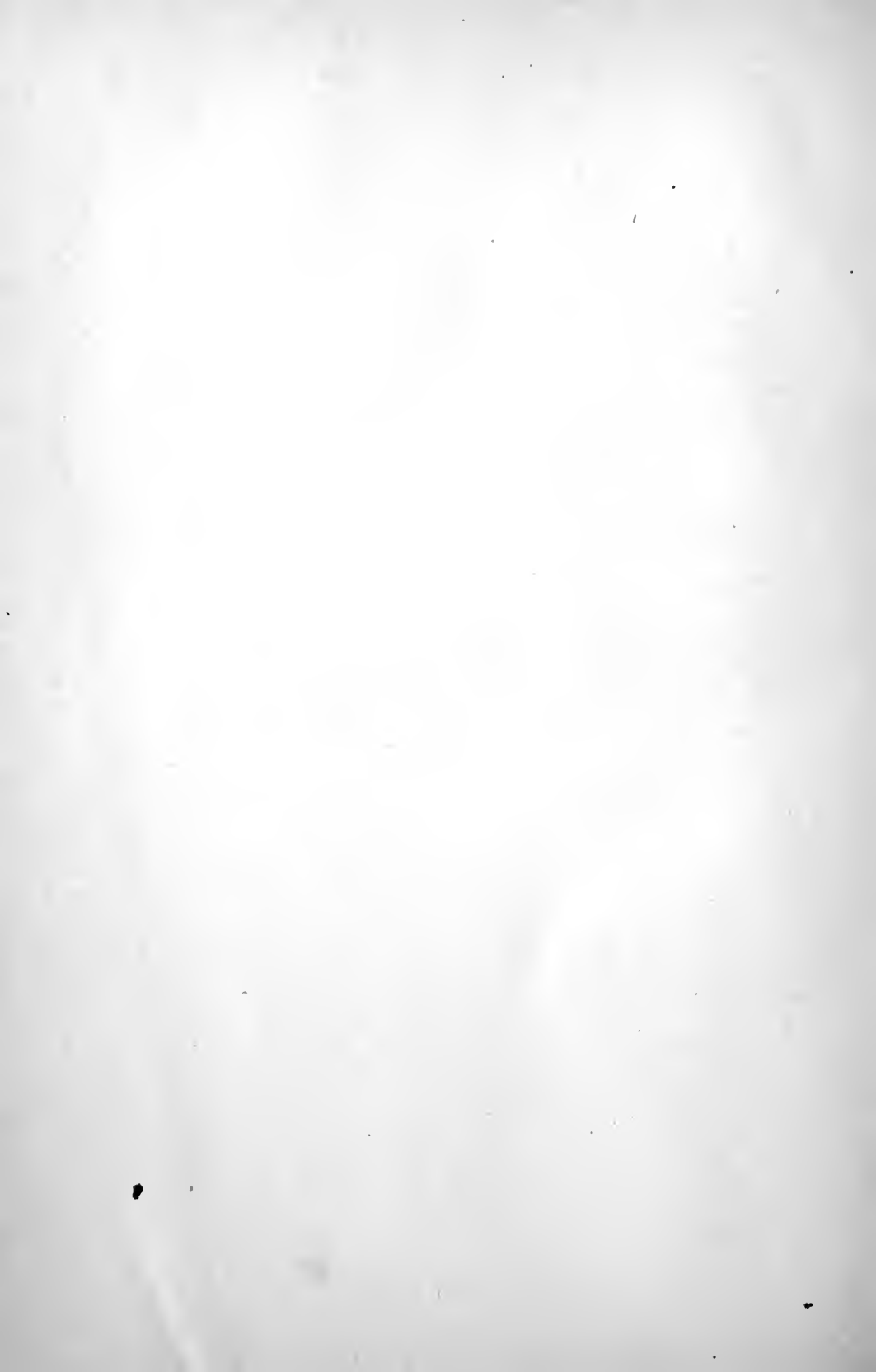
First—The prolongation of human life.

Second—The diminution of human suffering.

Third—By the judicious expenditure of a few thousands the safety of the lives of the citizens, the preservation of millions of dollars to the State.

CONCLUSION.

I did not attempt when speaking of laws, to express myself in the language of the law. I have neither the ability nor wisdom of a legislator. I have briefly, and I hope plainly, expressed what my short experience has taught me to believe as positively necessary to the perfect organization and practical operation of the State Sanitary Department. I hope the Legislature this winter will adopt the principal of, and improve upon my suggestions. If they do many will rise up in future years (who, under the present regime would be dead), and call them blessed, and if need be, cast their votes for them.



REPORT ON THE ADULTERATION OF FOOD.

BY

D. H. BECKWITH, M.D.,

Chairman of Committee on Adulteration of Foods, Drinks and Drugs.

REPORT ON THE ADULTERATION OF FOOD.

BY D. H. BECKWITH, M. D.

There is probably no more important subject before the thinking public of to-day, than the condition of our food supply ; and no subject, in the last decade, relating to the human economy, has received greater consideration, or elicited fuller discussion, than its contamination through the agency of adulteration.

The wonderful revelations of science have made possible not only the wholesale sophistication of most of our food products, but has provided a way, in numerous cases, for the actual substitution of fraudulent, if not pernicious, substances for many others.

To such an enormous extent has this been carried within the past few years, that legislative action in nearly all civilized countries of the world, has been taken with a view of alleviating, if not relieving, the sufferings of protesting humanity.

It is not the intent of this paper to enter into a discussion of the means of wiping out an industry which has undoubtedly come among us to stay, but rather to encourage such legitimate investigation as may lead our legislators to prompt action toward regulating its workings, whereby we may suffer in least measure from its evils.

While general laws and local police regulations have been in force for a long time in France, Germany, and other European countries respecting the preparation and sale of articles of food, to Great Britain must be awarded the honor of taking the initiative in the enactment of comprehensive laws regarding food adulterations ; and to English analysts the proud distinction of being the pioneers in this field of scientific research.

Much opposition to the enforcement of penalties imposed by these laws, has been met with at the hands of prosecuted and interested persons, who have claimed that the methods of detection employed were fallacious, or that results could not be had with any degree of certainty, owing to normal impurities incident to manufacture and subsequent handling ; but these arguments have gone down before the indefatigable efforts of expert professional energy and wise magistration, and in England, France and Germany, at least, the matter has been so adjusted as to drive most of the pernicious adulteration

from the market, and to so regulate the use of other sophistications, not absolutely injurious, as not to deceive the consumer.

At the present time, nearly all the adulterations are mere dilutions and substitutions in the interest of pecuniary gain, as exemplified in the dilution of milk, with water, and the substitution of glucose for cane syrups, so extensively practiced; careful research showing in nearly all cases, that the presence of absolutely pernicious ingredients is the result of accident, and not design. A notable exception, may, perhaps, be noted in the use of alum in damaged flour, but the effects of this adulteration upon the human system is, as yet, a matter of speculative controversy.

The laws of this country respecting adulteration, are moulded after those of England, but are greatly modified owing to exigencies and complications which have arisen in the different States. The recent passage by congress of the oleomargarine bill, is the first step taken by the general government to specifically regulate sophistications; but even that worthy act sought out rather the protection of the butter industry than the welfare of the consumer.

The wisdom of prohibitory legislation can be seen on our side of the water by the results obtained in Canada.

The work of examination there began in 1876, when 51.66 per cent. of the articles examined were found adulterated. In six years thereafter, or in 1882, this per centage had been reduced to twenty-five—a remarkable showing, when we consider that the only mode of punishment for infraction of the law has been the publication of the names of guilty parties.

It may be safely asserted that in every locality where the law does not deter from the act, adulterated articles are on sale in all kinds of food supply stores, even the most reputable. Not in all cases by design, perhaps, but for the reason that certain lines of manufactured goods can be had in no other condition, in the ordinary way of trade. Notably is this true of ground spices and condiments, the manufacturers of which carry as capital, and well paying capital too, receipts for incorporating foreign and worthless substances with the genuine article. In conversation with the manager of the spice department of a large and reputable house, not long ago, no attempt at concealment of this fact was made. The conception of adulteration in this particular line, he said, lay in a rapid advance of prices for the imported articles at one time; its growth in the gullibility of the consuming public, and its full maturity in the sharp competition of hard times.

In size and price, it may be observed, a box of spice is always the same.

Fluctuations in the prices of imports are counterbalanced by per centage of adulteration; a sort of differentiation which operates nicely for the producer but sadly deranges the digestion of the consumer.

The amount of evidence, relating to the subject of food adulteration offered in the publications of health boards in various parts of the country, is enor-

mous. To attempt a retrospect even, at this time, would be a work of supererogation.

A few facts which have been gathered from observation and research are presented herewith, as additions in a modest way, to the vast array of evidence already in.

These investigations have been carried on in the face of many difficulties.

The provision of proper appliances, the press of time, and the preparation of certain re-agents for laboratory work, which could be obtained in no other way, must serve as apologies for the meagerness of facts detailed. The methods of examination, however, have been critical, those employed by practical chemists of to-day being closely followed, and the determinations, wherever necessary, quantitative.

The samples examined were purchased in various parts of Cleveland, in a regular way, and generally without exciting any suspicions as to their destination.

The investigations began with

GLUCOSE,

And in view of the fact that about ten pounds of this product are manufactured in the United States for every man, woman and child therein annually, and that Cleveland is not quarantined against the rest of the country, a two hours' fruitless search for a small sample to be used in comparative analysis, was certainly discouraging. Druggists, wholesale and retail, had none, but, with singular unanimity, referred the inquirer to the candy manufacturers, who, to a man, knew nothing of the commodity.

Parenthetically, a specimen of taffy of another kind, abstracted from an inviting pile, yielded seventy-nine per cent. of glucose on analysis.

Glucose is probably the leading adulterant upon the market. It is largely used in syrups, low-grade sugars, jellies and cheap confections.

As artificially prepared it differs materially from cane sugar, having but about one-third the latter's sweetening power, and being devoid of color when in solution. It is frequently contaminated by the lime which is used to neutralize the sulphuric acid employed in the conversion of the starch into sugar.

Free acid is also claimed to be occasionally found. The presence of lime in the ash of sugars or syrups, obtained by burning off the organic matter and carbon, is a good indication of glucose adulteration in the example under estimation.

The cheapness of glucose, together with its close relationship to cane sugar enables the refiner to use it extensively as a sophistication at a handsome profit, and without fear of detection when shipped to country storekeepers and city dealers, in localities where sanitary laws are not rigorously enforced.

Per se, glucose is wholesome and nutritious. Its production encourages corn

growing, increases the sugar supply, and offers employment to capital and labor. So far the industry which it represents should be encouraged, but its sale as cane sugar is a fraud, and should be as completely tabooed as the sale of artificial butter for the genuine article. Its cheapness and poverty in saccharine matter demand its complete isolation.

In Europe glucose is largely prepared from potatoes; in this country, on account of its greater abundance, from corn, whence the names corn-sugar and corn-syrup, in common use. The starch which the corn contains is washed out after the grain has been steeped in warm water and ground into a pasty mass.

It is then alkaliized to remove the nitrogenous matter, washed and converted at the boiling point of water, with dilute sulphuric acid. The acid glucose solution is then neutralized with marble dust, the sulphuric acid, forming with the lime, a calcic sulphate, which being insoluble in water, is easily separated by subsidence. Finally to remove any traces of free acid which might accidentally remain, the solution is drawn off and agitated with lime milk.

Seven (7) samples of syrups were purchased for analysis; principally to determine the extent of glucose adulteration.

These were bought at as many different retail stores in various part of the city, and were in each case guaranteed free from adulteration. With Fehling's solution six of them were found to contain abnormal amounts of glucose.

The seventh, dark and unprepossessing in appearance, contained less than four per cent., about the usual quantity normal to cane sugars. The following table shows the complete result:

No. 1.	warranted cane, yielded	23.19 per cent. glucose.
No. 2.	“ “	19.76 “ “
No. 3.	“ “	29.30 “ “
No. 4.	“ “	43.06 “ “
No. 5.	“ “	3.97 “ “
No. 6.	“ “	16.15 “ “
No. 7.	“ “	31.68 “ “

Two of these, numbers two and six, the lightest colored in the group were incinerated and tested for the salts of tin, which are quite often used as bleaching agents, with the following results:

No. 2. 26 800-1000 grms, contained 231 mgrs. of ash and a free precipitate of iron sulphide which was not weighed.

No. 6. 13 960-1000 grms. contained 184 grms. ash, and 113 mgrs. of tin sulphide; the tin was precipitated from chlor-hydric solution by hydric sulphide. (The presence of iron in No. 2. is not accounted for). The chlorides of tin are poisons, being classed as such by Taylor and others.

BREAD.

It has been claimed by many writers on sanitary matters that the practice of adulterating bread is of rare occurrence in the United States; but the prominence of the alum question at the present time is significant of a different state of affairs. The reports of boards of health, and columns of sanitary journals, teem with essays on this important subject. The controversy among medical writers respecting the effect of this drug upon the system, has had the effect of encouraging its use, even by those who would desist from using it were it settled that its effects were injurious.

It is a well-known fact that when wheat is exposed at harvest time, in transportation, or in storage, to heat and moisture, it deteriorates. This is true as well of flour made from well harvested and carefully stored grain. Technically speaking, the deterioration has been caused by the albumen passing into a peculiar state called diastase.

Good bread from such flour is impossible, except by the addition of alum, which arrests the conversion of starch into dextrine and sugar. Without the alum the bread would be quite unsalable, would be sweet, sticky and heavy, and not light and porous as it should be.

The dark color in graham bread is not due wholly to the presence of dark colored particles of bran, but rather to certain peculiar nitrogeneous ingredients in the bran which are especially active in bringing about this state of diastase.

Carefully separation of the bran in a graham loaf, and comparison of the remaining crumb with the crumb of white bread will show this. Therefore without the intervention of some neutral agent, graham bread should exhibit some of the characteristics of loaves made from damaged flour, and the analyst might be well rewarded by exploring this particular field. Aside from the consideration of health, the use of alum as a vehicle to run unfit food upon the market, should certainly be prohibited. But if alum arrests the decomposition before the bread is taken into the stomach, why does it not in a measure prevent the dissolution of the gluten during assimilation?

Analyses of all the white and graham breads accessible in Cleveland, resulted in the finding of alum in but one sample, a four cent loaf, from one of the largest bakeries in the city. In the examination of flours no impurities of a deleterious character were found.

The microscope was not brought into requisition, so that no report can be made upon foreign starches.

The practice of using ammonium carbonate in cake has been acknowledged, but not investigated.

CANNED GOODS.

Fruits, vegetables and meats put up in tin packages deserve more attention than the limited time available in the preparation of this paper permitted.

But for an unfortunate circumstance which placed a storekeeper on his guard, several cans of "swelled head" vegetables would have been tested and reported upon. Becoming suspicious from the too critical examination of his wares he refused to sell, and withdrew the suspected goods. He volunteered the statement, however, that job lots of such goods were sold by wholesale houses to out-of-the-way grocers after the new stock had been received, and that plenty of "swelled heads" could be found next month. This was the only lot found which excited any suspicion; but the close of the season will bring out old stocks, and present a fair field for investigation.

MILK.

But one sample of this universal diet was subjected to analysis, and that one proved all that could be desired.

The mere inspection of milk, as generally practiced, is not sufficient to determine some of the most injurious contaminations. Even careful chemical analysis sometimes fails to detect poisonous secretions in the milk of cows. In some parts of the South, and even in this State, there is a particular malady known as "milk-sickness," confined to certain infected localities, produced by the milk of cows which graze upon the herbages in the natural woods.

This disease may be transmitted as well by the products of the milk. The cows, however, show no evidence of disease, but are apparently healthy in most cases.

There are also many well authenticated cases of the poisoning of people through the medium of the milk of cows which have eaten hyssop, spruce (buck-eye,) *æsculus glabra*, and other poisonous substances, and it is universally known that milk instantly reveals any change to feed having a peculiar or easily recognizable taste or smell, like turnips or wild parsnips. In the light of these facts, what may be said of the intentional impoverishment and contamination of milk by the feeding of distillery waste, brewer's grains, glucose and garbage, which is openly practiced in the city of Cleveland by unscrupulous venders?

VINEGARS.

But little, if any, cider vinegar is exposed for sale. Of a dozen samples examined not one was found to contain enough malic acid to form more than the faintest precipitate of lead malate, upon the addition of lead acetate, a simple but effective qualitative determination.

An examination of the reports of analysts, employed by the boards in different states, will reveal the fact that about all of our food supply is largely adulterated. Household articles, according to the following table, compiled

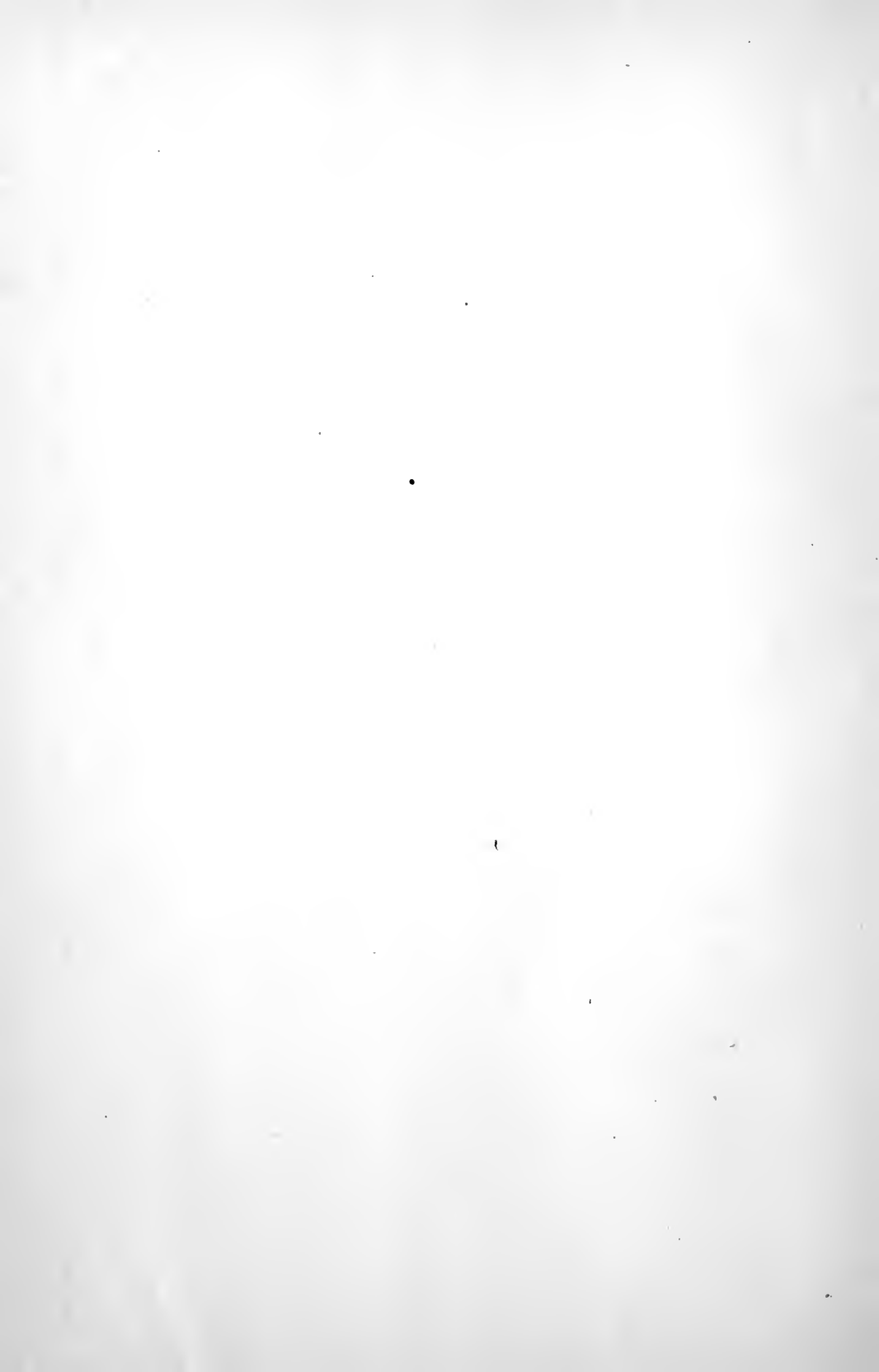
by Dr. Newton, of New Jersey, suffer to an alarming extent. The table is appended :

Spices and condiments.....	65 per cent.
Ground coffee.....	45 per cent.
Tea.....	48 per cent.
Lower grade sugar.....	20 per cent.
Syrups.....	50 per cent.
Milk, when not inspected	50 per cent.
Flour.....	none.
Bread.....	2 per cent.
Cream Tartar and baking powder.....	44 per cent.
Butter (substitution of other fats).....	40 per cent.
Vinegar	rarely cider.
Olive oil.....	60 per cent.

If figures do not lie, and scientific research deceive, we surely have in this table a finger-board to the path of professional duty, for this and other health boards throughout the United States.

Respectfully submitted.

D. H. BECKWITH, M. D.



REPORT ON WATER SUPPLY, SEWERAGE, ETC.,
OF BELLAIRE, OHIO.

BY

H. J. SHARP, M.D.,

Chairman of Committee on Water Sources, Sewerage, Drainage, etc.



REPORT ON THE WATER SUPPLY, SEWAGE, ETC., OF THE CITY OF BELLAIRE, OHIO.

BY H. J. SHARP, M. D.

Mr. President, and Gentlemen of the State Board of Health: In accordance with a resolution adopted at the meeting of this board in May, as chairman of the Committee on Water Sources, etc., in company with Dr. Wise, chairman of the Committee on Epidemics, etc., I visited the city of Bellaire, Ohio, on the 29th of May, for the purpose of investigating an epidemic of sickness that had been reported to the State Board of Health as prevailing in that city, and which was supposed to bear some causal relation to the water supply. Our arrival had been anticipated, and we were received by Dr. D. Q. Steere, a member of the city council, and chairman of the Sanitary Committee of that body. It being the night of the regular meeting of the city council, Dr. Steere arranged for us to meet that body, and we were pleased to find them a pleasant and intelligent body of gentlemen, ready to extend to us every courtesy and facility for the prosecution of our investigations, and to act upon such suggestions as we might deem advisable to improve the sanitary condition of their city.

On the following day, accompanied by the mayor, Mr. Eberle, chairman of the city council, and Dr. Steere, we made a tour of inspection of the city, noting the sanitary condition of the streets, the plan of sewerage and system of water supply; also, visited the city of Wheeling, W. Va.; viewed the site at which the night soil and garbage of the city of Wheeling is dumped into the Ohio river, and had a conference with Dr. George Baird and Dr. George I. Garrison, health officer, of Wheeling, concerning the feasibility of adopting some other plan for the disposal of the garbage and night soil that is dumped into the river, and which add greatly to the causes polluting the Bellaire water supply.

We found these gentlemen had given very careful and intelligent consideration to this subject, and by a series of experiments, carefully conducted, and which will be more fully referred to further along in this report, had demonstrated the feasibility of disposing of these substances by combustion in properly constructed furnaces, and had induced their city council to appropriate a fund for the erection of a crematory for such purpose.

To understand the situation at Bellaire, a few words descriptive of its topography, sewerage and system of water works, will not be amiss.

The city is built on a narrow plateau, and extends along the river for about two and a half miles, and is hemmed in by precipitous and high hills. The business and older part of the city is compactly built, the houses being crowded together and the streets rather narrow. The surface is alluvium with a gravely and sandy sub-soil. With all natural facilities for drainage, the system of sewerage is limited and defective, few of the streets having adequate sewers, and large sections of the city being without any means of drainage except as the water finds its way along open gutters and ditches; in many instances, the filthy black water might be seen coursing its way sluggishly in the gutters along the sidewalks in front of the residences and business houses, presenting anything but an inviting sanitary condition. Into the gravel and sand sub-soil have been sunk privy vaults, which may be found in all parts of the city, in many instances without protecting walls or other precaution against contaminating the sub soil by the percolation of their contents. Under these conditions it is not difficult to conceive that this old city is underlaid by a very volcano of foul gases and effluvia, that are liable to insidiously emanate with pestilential disaster to its people.

The sewers, as constructed or designed, are made to carry their contents into the river, or indirectly through Indian run and McMahon creek into the river. The water works supply the city with water taken from the river. The water is pumped into a reservoir some three hundred feet above the level of the river, and thence, by a system of wooden pipes, distributed to all parts of the city.

This water, as procured from a hydrant, is clear, and not in the least, to the eye, unattractive, but when the source of supply, the relation of a considerable portion of Bellaire's own sewage, and the sewage, together with the dumping of the garbage and night soil of Wheeling, are considered, one can not but wonder that the intelligent people of this city have not long since declared war upon the state of things found to exist.

Reference to the diagram will show a map of the city of Bellaire, prepared by City Engineer, A. J. Norton. As will be seen, the city of Bellaire is situated on the Ohio river, a short distance below the city of Wheeling, W. Va., the distance from the center of one to the center of the other city being about three and a half miles, and the lower part of the city of Wheeling extending to a point almost opposite the upper portion of the city of Bellaire.

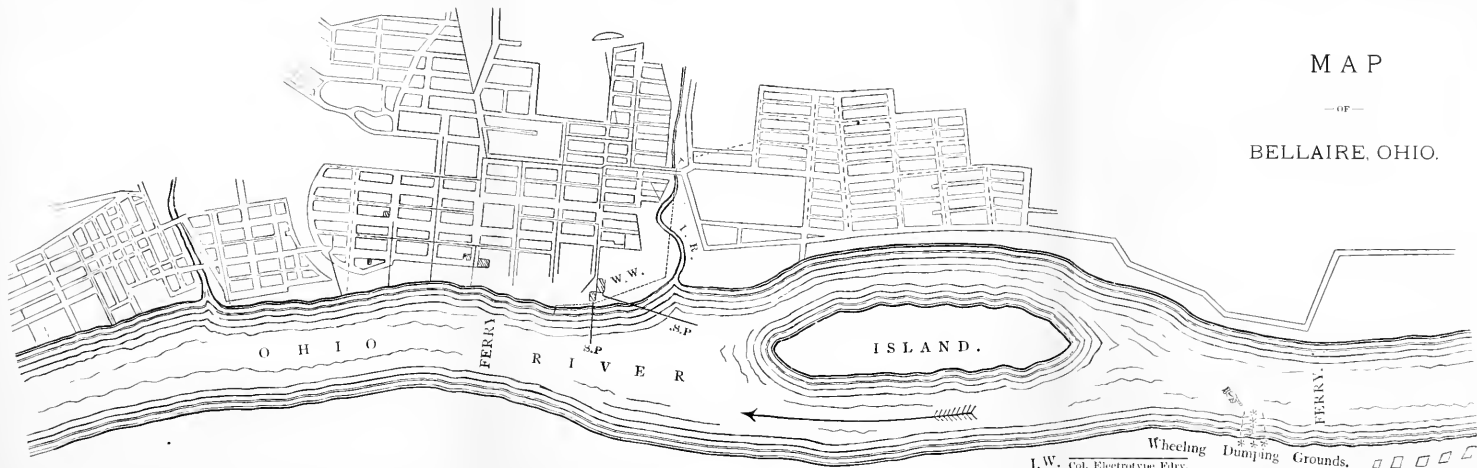
W W is the point on the river at which the power house of the Bellaire water works is situated.

S P and S P are supply pipes, through which the river water is brought to the pumps.

I R is Indian run, a small rivulet that runs from the hills in the rear of the

MAP

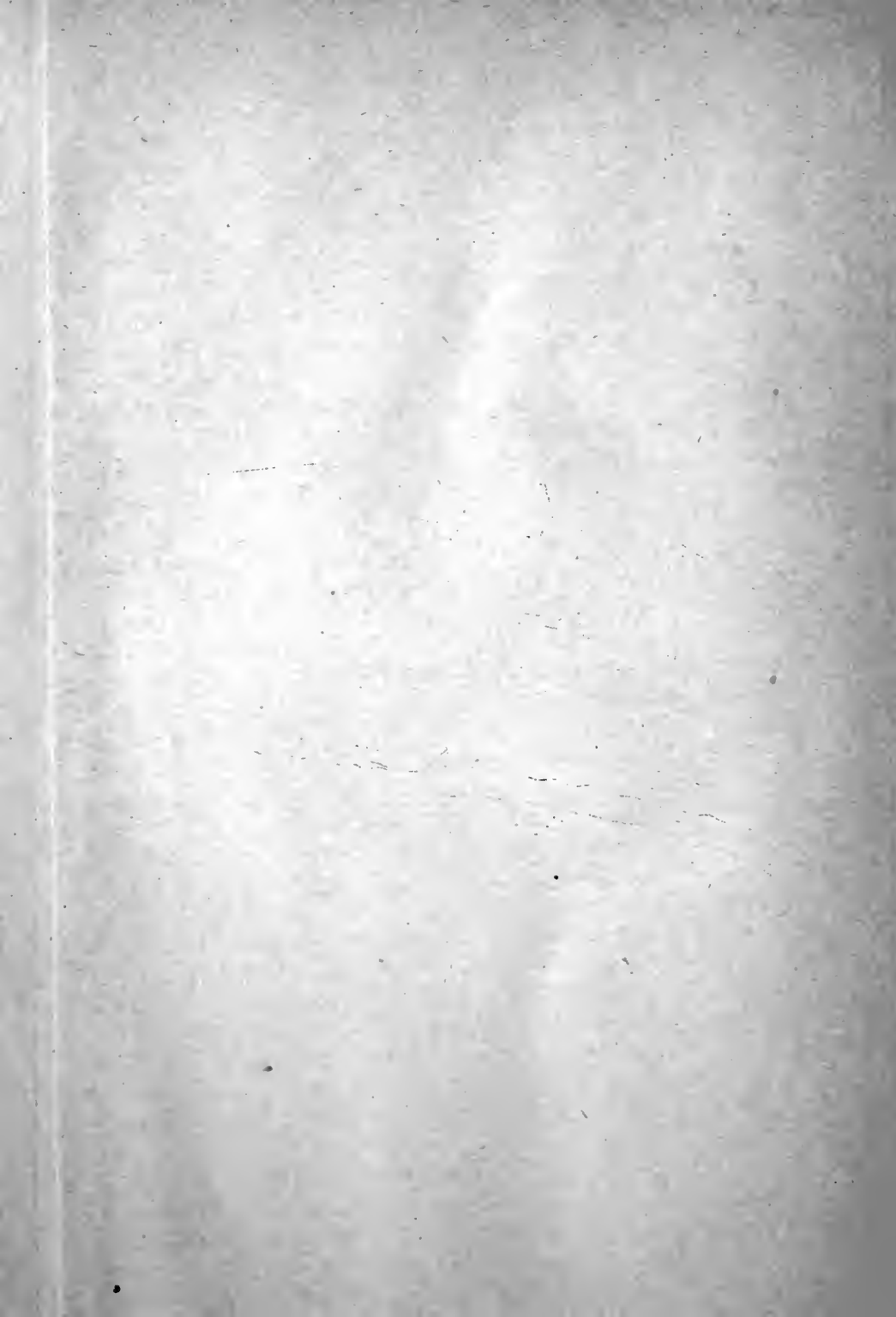
— OF —
BELLAIRE, OHIO.



Continuous lines represent finished sewers.
Dotted lines represent contemplated sewers.

J.W. Col. Electrotypic Edry.
WAX ENGRAVERS.

Wheeling Dumping Grounds. City of Wheeling.



city and empties into the river at a point just above the principal supply pipe. This rivulet drains the surplus water from one or more coal mines, and the waste water and sewage, through open ditches, and public and private sewers emptying into it, for a portion of the city containing some 2,500 inhabitants.

I is an island in the river nearer the Ohio than the West Virginia shore, which seems to divide the current of the stream.

DG is the dumping ground for the garbage and night soil of the city of Wheeling. The garbage and night soil is conveyed to this point in wagons and dumped into the river.

F is a ferry for the accommodation of persons crossing from one city to the other. Immediately above the ferry the sewers of the city of Wheeling commence, and are found emptying into the river at intervals along the entire river front of the city. The population of Wheeling is estimated at 30,000, that of Bellaire about 10,000.

In studying the diagram, it will be seen the sewage from about one-fourth (2,500) of the population of Bellaire empties into Indian run, and thence into the river at the mouth of the supply pipes of the water-works, and is pumped up with the water and distributed to citizens for use. This alone is reprehensible in high degree, and would be enough to pollute the water, but when we take into account the fact that the Wheeling dumping ground is only about one mile above these supply pipes, and that 2,000 to 3,000 loads of garbage and night soil are every season, and mostly when the river is at a low stage, dumped into the river, we cannot but conclude that these substances add very considerably to the causes that pollute the water of Bellaire.

Then, again, the sewage of Wheeling, a city of 30,000 people, is emptied into the river at distances from one to three miles only from the mouth of the supply pipes, whence the water for Bellaire is taken. What must then be the conclusion with these facts before us, as regards the purity or impurity of the water supply of this city? To recapitulate the causes of pollution, we have:

1. The sewage of a portion of the city of Bellaire, accommodating a population of 2,500, emptied right into the supply pipes of its own water-works; 2. The garbage and night soil of Wheeling dumped into the river only one mile above the water-works; and 3. The sewage of Wheeling emptied into the river at points that would average a distance of two miles only from these same supply pipes.

To determine the condition of the water of Bellaire, and the effects of some of the causes of pollution above enumerated, four specimens of water procured at points specified in his report, were submitted to Prof. C. C. Howard, of Columbus, O., for chemical analyses, and I take pleasure in appending his report, and in commending him for the interest manifested, and for the painstaking

and scientific ability brought to the aid of our committee in prosecuting the investigations of the subject, free of charge :

COLUMBUS, OHIO, July 23, 1886.

H. J. Sharp, M. D., London, O.—DEAR SIR: I have completed the chemical examination of the four samples of water sent from Bellaire, O., with the following results:

Parts per 100,000.

	Oxygen required.	Free Ammon. Ammon.	Albuminoid Ammon.	Nitrous acid.	Nitric acid.	Chlorine.	Total solids.
4. Ohio river 400 ft. above Wheeling, night soil dump .....	.35	.020	.012	.003	.347	.92	10.5
3. Power house, Bellaire water works .....	.36	.028	.015	.008	.356	.88	11.7
1. Hydrant B. & O. depot. 2. Hydrant 300 ft. above the river .....	.45	.011	.015	.001	.366	.88	11.3
	.86	.013	.018	.001	.375	.85	11.8

Inferences to be drawn from analytical data :

1st. Oxygen required. If .02 be taken as the maximum required for a good water, these samples are found to require from two to four times that quantity. One and two, though similar in many other respects, differ in the quantity of organic matter contained as shown both by the large quantity of oxygen required to oxidize organic matter in No. 2, and by the greater amount of charring on ignition.

2d. Free ammonia. The presence of this substance indicates that decomposition of nitrogenous organic matter has taken place, and the quantity becomes a measure of the extent of this decomposition.

A good water should not contain over .002 or .003 part per 100,000, and judged by this standard these waters contain a considerable quantity of decomposing nitrogenous matter. The reduction in the quantity of free ammonia in water taken from the hydrant is due, doubtless, to its exposure to the air in the reservoir, and does not prove that the objectional forms of organic matter present have been removed.

3d. Albuminoid ammonia. This represents a portion of the decomposing nitrogenous matter present in the water. The fact that the water drawn from the hydrant is not better than the water as taken from the river, is shown by the fact that there is no diminution of the factor, but rather a slight increase.

4th. The quantity of nitrous acid present in the two samples of river water, particularly that taken from the power house, marks it as an objectionable water: In the water drawn from the hydrants, the quantity present is much diminished, I believe, by the oxidation of the nitrous to nitric acid, an opportunity for which occurs when the water is thrown up into the stand pipe.

5th. Nitric acid. The quantity of this is quite uniform, slightly increased, however, in the samples drawn from the hydrants, and arising, probably, from the oxidation of the ammonia and nitrous acid.

6th. The chlorine is not particularly high for a river water.

7th. Total solid. These are low and indicate that the water is a soft one.

Examination of the quantitative results shows that the water taken in at the power

house is much more impure than the water taken a mile above, and 400 feet above the Wheeling night soil dump.

This shows, as might be expected, that the pollution of the water by the night soil dump is not overcome by the slight purification exerted in running one mile. The effects of such purification are clearly seen in the changes taking place in the water after being thrown into the reservoir.

It would be valuable to examine the river water above the entrance of the Wheeling sewers.

I am, very respectfully,

CURTIS C. HOWARD.

Wheeling's water supply is taken from the Ohio river, but the city is liable to some extent for the same crime against sanitation that is chargeable to Bellaire, in that the supply pipes do not extend sufficiently far up the river to be uninfluenced by the sewage of the upper portion of the city. In a chemical examination made by Prof. Dwight of the Wheeling water, a partial report of which Dr. Geo. I. Garrison has kindly sent to me, the water in the reservoir shows as follows:

Parts per 100,000.		
Free ammonia.	Albuminoid ammonia.	Organic carbon.
.007	.093	.056

These results mark the Wheeling water as objectionable and far from pure.

Prof. Howard's report of the chemical examination of the Bellaire water is full and comprehensive, and very little further need be said by way of comment, more than to make some comparative allusion to some of the results, and to consider some of the measures that would promise remedial relief from the evils entailed.

By comparing the chemical results in Nos. 3 and 4, No. 4 taken from the river 400 feet above the Wheeling night soil and garbage dump, is less polluted than No. 3 at the power house.

Wheeling dumpage is to some extent responsible for this increase, but not wholly so, for Indian run, which is nothing more nor less than an open sewer for the accommodation of some 3,000 of Bellaire's population, empties its sewage immediately into these same supply pipes, and it is taken up without very much dilution, or the purifying effects of a greater distance to flow.

The city of Bellaire must be held responsible for this, their own crime against sanitation, and should at once proceed to remedy the evils, so apparent to all, by carrying Indian run by a properly constructed conduit to a point sufficiently far below their water supply that there will be no danger of contamination from this source. Some such plan has been contemplated, I believe, and I hope, with the interest that has been awakened in behalf of a higher order of sanitary observances, this improvement will soon be made.

The sanitary authorities of Wheeling, under the leadership of such wide-awake and intelligent sanitarians as Drs. Baird, Garrison and Reeves, and actuated by the first law of human nature, self-preservation, as well as humanitarian motives of benefaction, have prevailed upon their wide awake city council to appropriate a sufficient sum for the erection of a suitable furnace or crematory for the combustion of all waste matter of their city, except sewage. This plan of disposal of the night soil and garbage will relieve the city of Bellaire of a large amount of filth and polluting matter that has for a long time been dumped into the river. This undertaking of Wheeling for the incineration of this waste matter, is one that must, from its precedence in carrying out a principle that has been inculcated recently by progressive sanitarians, be hailed with very great interest. I have deemed this undertaking of such importance that I requested Dr. George I. Garrison, health officer of the city of Wheeling, to furnish a history descriptive of the experiments that have led to the adoption of this method and the erection of the crematory, that is now nearly completed, by that city.

He has kindly complied, and, with much pleasure, I include it in full.

WHEELING, W. VA., November 3, 1886.

Dr. H. J. Sharp, London, Ohio—DEAR DOCTOR: It gives me pleasure to answer your inquiries in relation to the experiments which led to the construction of a furnace for the destruction of night soil, garbage, etc., in this city. Something over a year ago the city council appropriated \$5,000 for the erection of a furnace for that purpose. The most diligent inquiries, however, failed to find one in operation anywhere, or any person or corporation who would build one and guarantee it to accomplish the purpose for which it was designed, and the subject was dropped. In May, 1886, it was revived, and our wide-awake council appropriated a sufficient sum of money to be used under the direction of the health department in prosecuting experiments, the first of which was made at the gas works.

Night soil was mixed half and half with cinder, coke and slack, and introduced into separate retorts, about one barrel in each retort. The time required for each incineration, in each case, was about two hours. The burning mass emitted an odor like that of burning leather.

The next experiment was made in a boiling furnace, at the Belmont mills, which had been previously heated to a white heat, at which time two barrels of night soil were mixed with slack, equal parts, and consumed in about three hours. The same odor was observed as in the first experiment.

The third and last experiment was made in a Smith heating furnace. A barrel of garbage, one of bone and two of night soil having been procured, the first was introduced and consumed in about three minutes. The bones required about seven minutes to be reduced to ashes. A half barrel of night soil was mixed with an equal quantity of cinder and next introduced. It was found that the cinder was a hindrance rather than a help to its destruction, and it was decided to introduce the remaining portion of night soil unmixed. It was poured into the furnace from a bucket,

and consumed almost as rapidly as introduced. There was not a particle of odor from the furnace, as in the first two experiments.

The report of the results of our experiments was made to the council, which was accepted, and the committee on health authorized to advertise for plans and specifications of a crematory with sufficient capacity to incinerate all the waste of the city, except sewage.

There was but one plan submitted which seemed to meet the requirements, and, accordingly, Mr. Smith, its inventor, was awarded the contract.

The crematory, now almost completed, when finished, will be 45 feet long, 6 feet wide, and 9 feet high, and will consume sixty barrels of night soil per hour.

It will have an opening large enough to admit the carcass of a horse. It is built of fire brick, and the fuel will be natural gas. With the addition of a "generator," Mr. Smith says, coal, tanbark, peat, etc., can be made to furnish artificial gas as cheap as the product of nature.

I am confident that the crematory will economically and thoroughly destroy the large amount of filth that heretofore has been cast into the Ohio river, greatly to the detriment of our neighboring cities below, and, in relieving them of our filth, we, in return, will be relieved of much filth from cities above us, who will follow our example. Already, the authorities of McKeesport and Allegheny City have signified their intention of duplicating our crematory, as soon as its success can be proven.

I believe that the time is not far distant when cities everywhere, inland or seaport, will cremate all garbage and waste of whatever character.

Respectfully yours,

GEO. I. GARRISON, M. D., *Health Officer.*

Should this experiment of the enterprising city of our sister State prove successful, I think Dr. Garrison's prediction will be more than realized by other cities rapidly adopting a similar method. In the last two years the disposal of human excreta, garbage, and such like substances, by combustion, has been a favorite theme among sanitarians, but it has remained for this wide-awake little city to do the pioneering by the construction of the first crematory for the purpose, of which I have any knowledge in this country. It may be true that other similar furnaces have been erected, but I am aware that many others, who, like myself, have been interested in this subject, have not been able to point them out. With this method in vogue, generally, our inland lakes and rivers would be relieved of the most fruitful source of pollution, and the water supply of cities would be much purer.

With this disposition of this portion of Wheeling's waste matter, and the proposed changes and improvements of Indian run, the water supply of Bellaire will be much improved in purity, but will it not still be very objectionable, owing to the sewage of the city of Wheeling being received into the river at so slight distance above?

I think it will be impossible for Bellaire to have anything like a pure water, unless its supply pipes are carried above the city of Wheeling. The question of filtration has been offered as a remedy in similar cases, but it is doubtful i

any system of filtration in vogue would assure that degree of purification that a water contaminated with a large quantity of sewage should undergo to make it potable. Some inventors claim for their systems such combination of the principles of sedimentation or precipitation by the aid of chemicals, and the introduction of oxygen through compressed air with that of filtration, that the nitrogenous elements in solution as well as other matter in suspension, are neutralized and separated so that purification can be relied upon under such conditions as are found to exist in the case before us.

I concede that great advancement has been made, in recent years, in processes for the purification of water through some systems of filtration, but doubt if the more attenuated forms of the poisons recognized by pathologists, and denominated disease germs, can be separated by such processes.

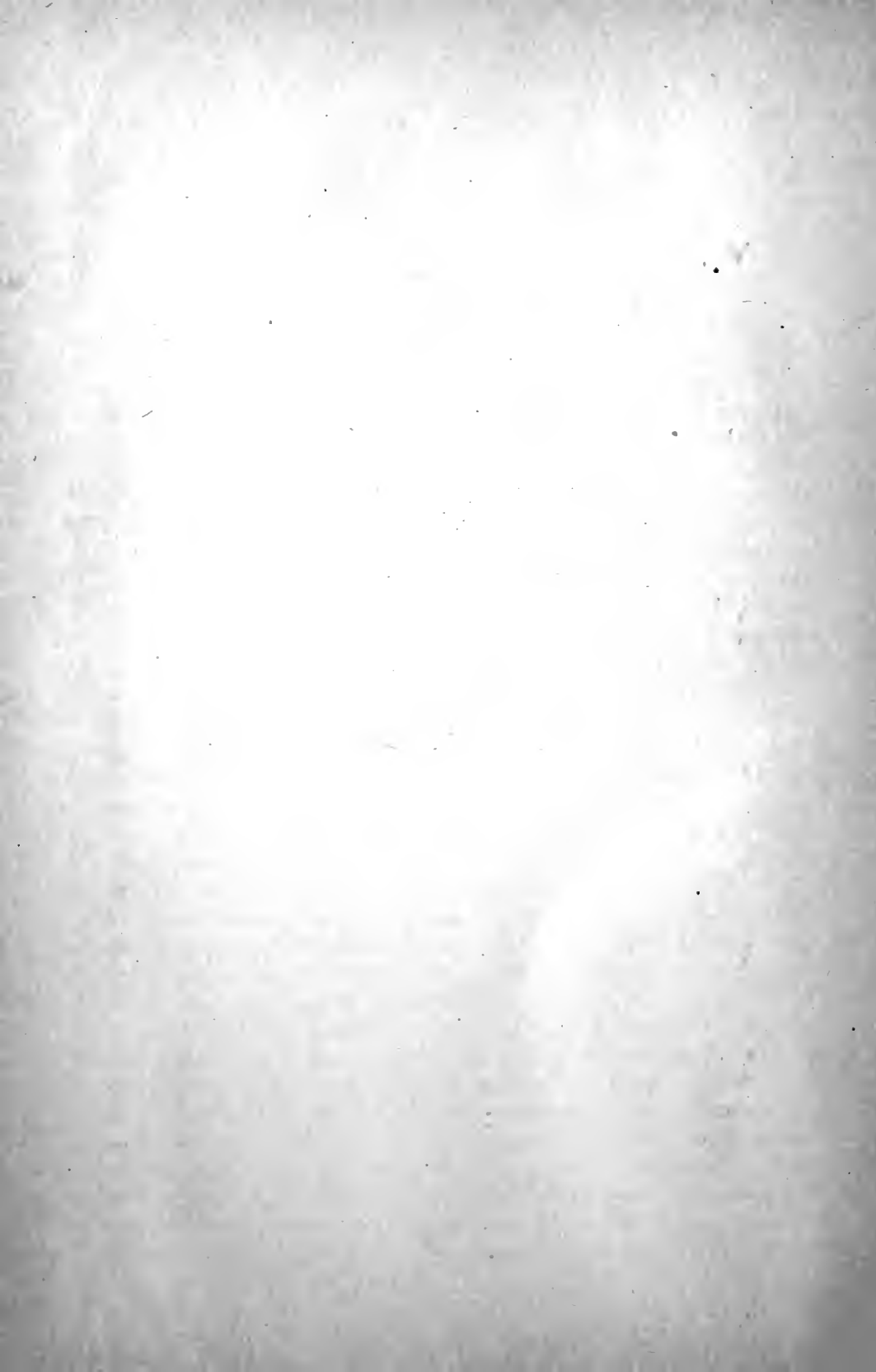
With relations that exist between the cities of Bellaire and Wheeling, one can easily conceive how an epidemic of cholera, typhoid fever or other similar infectious disease of malignant type, originating in the latter, might be conveyed through the drinking water to the citizens of the former, and cause the pall of the shadow of death to overspread that city, and as of old would be sung that touching requiem: "In Rama was there a voice heard, lamentation, and weeping and great mourning, Rachel weeping for her children, and would not be comforted because they are not."

REPORT ON INVESTIGATION OF THE EPIDEMIC
AT BELLAIRE, OHIO, WITH REMARKS.

BY

SIMON P. WISÉ, M.D.,

Chairman of the Committee on Epidemic and Endemic Diseases and Quarantine.



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BY SIMON P. WISE, M. D.

Information having reached the President and several members of the Board, that typhoid fever was prevailing to an alarming extent in the city of Bellaire, and was attended by a high rate of mortality, the matter was brought to the attention of the Board at the June meeting, and it was deemed necessary that an investigation be instituted. It was accordingly referred to the proper committees, with instructions to visit Bellaire at once and ascertain the nature of the disease and the cause leading thereto. In obedience to said instructions, Dr. Sharp, chairman of the Committee on Water-sources, Sewerage, Drainage, etc., and myself went thither on the 29th of June, 1886. We were very kindly received by the medical profession, as well as by the mayor, city council and citizens.

As might have been anticipated, we found that the facts in regard to the disease had been grossly misrepresented, especially as to the number of fatal cases. This exaggeration of number of deaths was no doubt largely due to the reprehensible custom which is said to prevail in that city, of placing crape upon the doors of near relatives of the deceased, thus conveying the impression to the uninitiated of a greater number of deaths than in reality occurred.

As the press reports had already somewhat jeopardized the business interests of the city, by spreading broad-cast the information that an epidemic of large proportions was prevailing there, we deemed it proper to avoid, as much as possible, giving the matter of our visit unnecessary publicity; therefore we made our stay as brief as possible, remaining only one day. Moreover, it is evident to any one who is acquainted with the nature of sanitary inspections and the labor they entail, that a member of the Board who is actively engaged in the practice of his profession, could not possibly devote such a length of time to an investigation as would be required to obtain complete and reliable data from which correct deductions could be drawn, and which must be had in order to render a report of some scientific value. I observe that other state boards have sanitary inspectors in their employ, who evidently have leisure, and receive sufficient compensation to justify them in devoting all the time to their work that may be required to carry out each investigation to its minutest details. This enables them to unravel the mystery that frequently surrounds

an outbreak of disease, and to present the facts in elaborate and exhaustive reports, which often constitute valuable contributions to sanitary literature. The employment of such expert assistance was not provided for by the law creating the Ohio State Board, hence it will be obliged to depend upon the efforts of its individual members, together with such aid as may be kindly contributed by members of the medical profession, and sanitarians throughout the State.

Owing to the lack of time and consequent meagre data, this report will contain only a general description of the fever, as kindly furnished me by Dr. Steere, of that city, together with such general information as I obtained in brief conversation with a number of resident physicians and private citizens. Through the kindness of the mayor and city council our work was very much expedited. They provided us with a conveyance, and conducted us to all the points of interest throughout the city, pointing out all the defects in their sewerage system, and the faulty condition in their water supply, and numerous examples of bad local sanitation. It must, therefore, be remembered that they were by no means ignorant of nor oblivious to the bad sanitary condition of their city, but were fully alive to the situation, and had been making vigorous efforts to extend and correct their sewers, and to enforce better sanitary regulations; but owing to the want of funds, and general apathy of the citizens in respect to sanitary matters, their efforts had hitherto been futile.

A full description of the sewerage, water supply, and local sanitary conditions will no doubt be presented in the report of Dr. Sharp, the chairman of the committee, on that subject. I may, however, be permitted to say that if we take into consideration the defective and inadequate sewerage; the gutters in numerous localities serving as receptacles for slops and garbage; the privy vaults, being simply pits dug into the earth, and their contents permeating the soil, and when heavy rains occur overflowing and saturating the surface for quite a distance around, and evolving noxious gases under the influence of the midsummer sun; the fact that one of the principal sewers discharged its contents into the river a short distance above the point from whence the water supply was taken, and lastly, but by no means least of all, the fact that the city of Wheeling, less than a mile above the Bellaire water-works, was committing the gigantic nuisance of polluting the river with the excreta of 35,000 inhabitants, presents the most startling picture of outraged sanitation that the human mind could possibly conceive; a scene the contemplation of which would cause Hygea's cheeks to burn with shame, and would impel her to depart from thence forever*.

*NOTE.—Since this writing, I am informed that a local board of health has been established, which has adopted an excellent code of health laws. Also contracts have been let for the construction of new sewers, and such an interest in sanitary matters has been manifested as portends a speedy correction of all the faulty conditions referred to.

While the city of Bellaire is the special subject of consideration of this paper, yet what can be said of this city applies also to the vast majority of towns and villages within the borders of our State. I am utterly surprised, since my attention has been specially directed to this subject, how few towns within my personal knowledge are above even ordinary criticism. And it is self evident that this state of affairs will never be remedied as long as the matter of sanitation is vested in the sanitary committees of town councils. The fault is not so much with the municipal managers as a body, nor with its individual members, as with the entire system of city government. We generally find town councils composed of very intelligent men, who are highly interested in the welfare and prosperity of the towns in which they reside, and often are capable of wielding a great amount of influence. But they are expected to give a large amount of valuable time and personal attention to the interests of their city, without a farthing of compensation. In fact, instead of remuneration, they frequently receive condemnation and abuse at the hands of their constituents. It requires quite a sacrifice of time from their respective vocations to be regularly in attendance at their meetings, let alone the study and prosecution of sanitary matters to which they cannot afford to devote any time or attention.

Another reason why councils are inefficient in the enforcement of sanitary regulations, is the fact that the members generally strive to carry out the will of their personal friends and constituency, the chief aim often being to gain a reputation for economy and retrenchment, to lessen the burden of municipal taxation, and it is frequently the case that they are elected with the understanding that they are to oppose the construction of some new sewer, or to exert their influence to defeat some important sanitary improvement, no matter how essential it may be to the preservation of health, simply because it involves the expenditure of money. Moreover, the proceedings of councils are generally conducted in open session, in the presence of all who may choose to attend, hence their transactions may be moulded by outside pressure or by minority influence. The complainant being known to the public, it often occurs that nuisances are tolerated, and sanitary movements are frustrated, because the parties interested are influential citizens, and their displeasure dare not be incurred.

Much more might be said on this subject, but from the foregoing facts it is obvious that municipal sanitation must ever be a failure while it is intrusted in the hands of sanitary committees appointed by municipal authorities; and the only remedy is the establishment of local boards of health, which should by all means be *obligatory* instead of *optional*, as the statutes now provide. These local boards should be composed of physicians and such other persons who are sufficiently interested in sanitary science to inform themselves upon the subject, and who are capable of appreciating the importance of the enforcement

and strict observance of hygienic laws. With good local boards in all of our towns and villages composed of earnest workers, who will take pleasure in co-operating with the State Board in disseminating sanitary literature among the people, and aiding us in educating and enlightening them upon this subject of inestimable importance to their lives, health and well-being; with the principles of sanitary science taught to our children in our public schools, and the precepts of hygiene inculcated in their minds in the days of their youth, our labors will be crowned with success, and our fondest hopes will be realized, and such a magnificent reform will be inaugurated as will mark an important era in the history of our State. But without this aid and assistance, the most strenuous efforts on the part of the State Board of Health will be unavailing.

The history of Bellaire, in point of salubrity is one of sickness, perhaps above the average degree. According to the statement of those resident physicians who have been living there for a number of years, typhoid fever may be said to prevail endemically, cases occurring during every month of the year. An examination of the mortality reports at the health office at Wheeling, disclosed the fact that the same may be said also of that city. Diphtheria has also occurred sporadically, but perhaps to no greater extent than elsewhere, with the exception of the year 1871 at which time, I was informed by Dr. Kurz, the city was visited by an epidemic of no small magnitude, which was quite malignant in character. This epidemic was supposed to have been due to an overflow of the Ohio river, inundating the lower portions of the city and surrounding country. The flood took place in the month of June, and was immediately followed by very hot weather and a prolonged dry period. Wheeling also participated in this epidemic. We were also informed that periodical malarial fevers were quite common in this locality in years gone by, but that fevers of a distinct malarial type have gradually given place to the enteric forms of fever.

This statement is in accord with that of Dr. Drake, a keen observer and writer on the subject of "Fevers in the North American Valley," and is also corroborated by the observations of the older practitioners of medicine, "that intermittents and remittents were the prevailing forms of fever when the first settlements were made; that, as time passed by, and cultivation progressed, the intermittents diminished in frequency, and the remittents exhibited more and more a tendency to pass into the continued forms of fever, and finally were replaced by ordinary typhoid fever, which became the prevailing epidemic fever."

At the time of our visit, the epidemic had almost wholly subsided, there being only a few remaining cases, several of which we visited. Strictly speaking, it was an endemic, there being no cases in the surrounding country except a few who had visited the city, and had evidently contracted the disease

while there. The total number of fully developed cases, collected by Dr. Steere, from all the physicians of the city, amounted to 308, eleven of which proved fatal. He adds, however, that had all the cases of slight indisposition and increased temperature been taken into account, the number would have approached one thousand. The following general description of the disease was kindly furnished me by the above named physician :

“The rule was that the patient was taken suddenly with violent headache and pain in the back of the neck and limbs ; some with vomiting ; great restlessness, chilly sensations, and in some cases chills, high fever, temperature ranging from 100° to as high as 106° F, mind clear, as a rule ; in a few cases there was very active delirium. The tongue was coated, but moist and indented by the teeth, anorexia complete, and bowels loose with tendency to diarrhœa. There was a very profuse and wide-spread rash in a few cases, extending all over the body, but, as a rule, there was no rose-colored eruption. A few cases were reported in which there was quite a profuse hemorrhage from the bowels. In all these cases, as far as I can learn, the temperature had been high all through the disease. The duration of the fever ranged from a day or two to fourteen or fifteen days, and almost uniformly ended in recovery.”

The important question naturally arises, what name should be applied to this “Bellaire” fever? What place should it occupy in the nosology of disease? I have no doubt that if this question was addressed to a large number of physicians, the response would exemplify the most marked diversity of opinion and lack of unanimity, that possibly could exist upon any question pertaining to the nature of disease. The majority, probably, would denominate it typho-malarial ; others, continued malarial, while others might style it simple continued fever, and many, no doubt, would stand non-committed upon the question — “non committal fever” might not be an inappropriate name for the disease. That this same type of fever is prevalent throughout our State, both in towns and villages, and notably in the rural districts, is a fact well-known to any one who has been engaged in the practice of medicine for a number of years past. It is true it may vary somewhat in different localities, both in severity as well as in some of its clinical features, owing, no doubt, to important differences in the causes producing it ; yet it is safe to assert that it is the same form of fever, and in all cases is tracable to bad sanitation. Amidst all this vast array of diversified and contradictory opinions, it cannot effect the chaos very materially, if I contribute my mite to the confusion by making the broad, sweeping statement that I believe *that all those fevers which do not exhibit a definite malarial character, either remittent or intermittent, are but mild or modified forms of typhoid fever, due to the same materies morbi, and their differences in severity are dependent upon different degrees of typhoid infection.* The de-

gree of infection may vary from the large amount producing the most virulent form of the disease—which may be determined somewhat by the individual predisposition of the patient—on down through a scale of infinite gradations to the minor forms of infection; in fact, it may be so slight as to occasion only a brief elevation of temperature and slight intestinal catarrh.

We have a striking analogue representing different degrees of infection in scarlet fever. In this disease we may have in one case the most malignant form of the disease, while in another the infection may be so insignificant as to almost escape detection; and between these two extremes we find various intermediate grades of infection, manifested by the mildness or intensity of the symptoms; yet no one would dare to gainsay but that all of these varieties of scarlet fever were produced by one and the same poison.

The promulgation of such a theory may be regarded as heterodox in the light of standard authority, and when brought face to face with the largely accepted germ theory of typhoid fever; but this opinion was not arrived at by means of the microscope, by soaring into the transcendent realms of bacteriology, but it is evolved by viewing the matter through the lens of common sense in the light of practical every-day experience. The chief obstacle in the way of general acceptance of this view by the profession, is the fact that they have been bound and fettered by the dictum of text-book authority, to the doctrine that in order that a fever may be entitled to the name typhoid, it must answer the stereotyped description as laid down by Louis in 1829; that the disease must describe a definite temperature curve, and there must be present tympany, gurgling in the right iliac fossa, diarrhœa, certain nervous phenomena, rose-colored spots, etc., etc.; and if a disease does not exhibit the above clinical history, with all those pathognomonic symptoms, that it cannot be typhoid, and necessarily must be malarial or some other hybrid form of fever. Now it seems to me that fifty nine years of faithful allegiance to a doctrine that has become time-worn and weather-beaten is all sufficient, and the time has about arrived when it should be subjected to the crucial test of criticism. Let us see whether the foundation upon which it rests is not crumbling, and whether it is not in danger of falling to the ground.

The scope of this paper will not permit of an elaborate discussion of the subject, and I shall limit myself to the leading points relative to the distinctive character of typhoid fever as compared with the other forms of fever under consideration; and shall prove by excellent authorities that in reality it has no symptoms or pathological conditions which are not common to all the so-called hybrid forms of fever.

We often hear it positively asserted that the existence of typhoid fever can be determined beyond all doubt by means of the thermometer alone, without taking into account any of the other objective symptoms; the temperature

range being of such definite uniformity as to leave no room for error. Even Loomis evinces his concurrence in this statement in the following language: "A temperature of 104° at any time during the first and second day, will consequently exclude typhoid fever from the diagnosis."

An examination of the schematic representation of the typical range of temperature, as presented by Liebermeister and Hutchinson in their articles on this subject, shows a gradual rise from the normal to $105\frac{1}{2}^{\circ}$ on the eighth day, yet they both admit that this is by no means uniform, but is subject to marked deviations, especially in the mild and abortive forms of fever. Liebermeister says: "If we should undertake to give a picture of typhoid fever, which would be true of all its varieties, we would meet with insurmountable obstacles. We are compelled to take account of the numerous varieties which exist, and to consider the different forms which the disease assumes." He describes the abortive forms as follows: "Such cases often begin suddenly without prodromata; the temperature rises rapidly so as to reach 104° on the second or third day. The rapid rise of temperature is accompanied sometimes by rigors or even a chill. For some time the temperature lingers at its height, and then the morning remissions begin, and the course of the temperature corresponds to that of the fourth week of the severe cases, excepting that the return to the normal temperature is much more rapid, and is often accomplished within a few days. Sometimes the absolute grade of temperature is very high. For example, I have met with cases in which the temperature in the axilla rose to 106° or still higher, and yet the total duration of the fever, amounting to from seven to twelve days." On the other hand, Strube observed an epidemic during the siege of Paris which he describes as follows: "In many of the cases the temperature throughout was sub-normal, and in others never exceeded the normal point. The roseola was usually profuse; the nervous symptoms were of marked severity, and were in inverse ratio to the temperature, consisting of violent delirium alternating with stupor; the duration of the fever was very short, defervescence usually taking place at the end of a fortnight. The tongue did not become dry and brown; the abdominal symptoms were slight, but the characteristic lesions were found on post mortem examination."

It might be urged that the mild or abortive forms of typhoid fever are of such rare occurrences as not to deserve consideration. That this is not the case can be proven by reference to the statistics of the hospital at Basle for the year 1869, which discloses the fact besides 206 cases of more or less perfectly developed cases of typhoid fever, there were also under treatment twenty nine cases of febrile, and 139 cases of "afebrile abdominal catarrh." And Liebermeister says regarding the latter: "No inconsiderable portion of which I believe are to be imputed to typhoid infection." Also, according to

the report of Streckeisen on the epidemic at Zurich, the number of reported cases was 2,847, and, if the trivial cases called febrile abdominal catarrh are included, the entire number reached 3,756.

The foregoing statements made by observers of undoubted reliability and great scientific acumen, can by no means be ignored, and they prove conclusively that the slighter forms of typhoid infection are quite numerous, and are generally present whenever an epidemic of typhoid fever occurs. We need not confine ourselves, however, to hospital records, nor to the health reports of large cities to establish this fact. As every rural practitioner who has had a moderate experience in the treatment of this fever will have observed that when he has had under treatment four or five members of the same family with this fever, that in one or more of them it pursued a mild course, lacking some of its important symptoms, and frequently convalescing rapidly after the fourteenth day; yet no one would doubt but that they were true cases of typhoid fever, and were due to the same cause as the more severe ones. Or would it be reasonable to suppose that five or six persons living under the same conditions and surrounded by the same sanitary influences, could be stricken down almost simultaneously with fever, and it would be typhoid in some of the cases, and some nonsensical malarial fever in the others? I can recall to memory from my own experience five families in which the total number sick was twenty-three, and out of that number nine were of the mild type of the fever, and had they been isolated from the rest, might have readily been mistaken for one of the so-called hybrid forms of fever.

One of the strongest arguments establishing the identity of typhoid fever is, that its intestinal lesions are constant and absolutely characteristic; and that the absence of these essential pathological conditions in the other species of fever clearly proves their non-identity. It is, therefore, apparent that in order to determine whether a certain fever is typhoid or not, it becomes necessary that a number of careful autopsies should be held so as to make our investigation satisfactory and conclusive. As we have not had the opportunity of making such necroscopic investigations in the case of the Bellaire fever, we must content ourselves without these data.

When we undertake to study the differential diagnosis of these essential fevers, and take into consideration the vast number of exceptions and similitudes, we are led into a state of mental confusion from which it is impossible to extricate ourselves. The evidences of similarity being so numerous, and the shades of distinction being drawn so finely as to efface all border lines, and it is presented to our minds as a vast whole, so that the conviction is forced upon us that we are studying only different varieties of the same disease. For instance, Loomis under the head of "Continued malarial fever" (which term he uses synonymously with typho-malarial fever) says: "The septic type in

many of its phenomena so closely resembles typhoid fever that frequently it is difficult to make a differential diagnosis." Woodward in his paper on typho-malarial fever, read before the International Medical Congress, at Philadelphia, in 1876, says, in speaking of the pathological conditions found in this fever as compared with true typhoid, "I for one confess myself unable to draw a line between these two conditions. Anatomically they appear to pass into each other by insensible gradations." Further on he says, "There is really nothing in the lesions of Peyer's glands in these cases to distinguish them from ordinary typhoid fever; and it was just these lesions so well known to you all that I need not pause to describe them, which were observed in the vast majority of those fatal cases of fever occurring during the late war in which autopsies have been recorded or specimens preserved."

Truly, the above statements makes one sceptical as to the existence of such a disease as typho-malarial fever. If it resembles typhoid fever so closely in its clinical features and pathological lesion as to render it utterly impossible to to discriminate between them, why should it be other than the same disease? We must admit, however, that if ever the conditions were favorable for the co-existence of these two poisons, it was during our late war, when the raw, un-acclimated troops of the north were sent at once to campaign or lay in camp in the miasmatic valleys of the Potomac or the Mississippi and its tributaries, surrounded by bogs and stagnant pools, and exposed to the inclemencies of the weather, while their vitality was lowered by insufficient and improper food and hardship. But I cannot believe that in the absence of these unfavorable and anti-hygienic conditions, such as we find in our northern towns, and villages and rural districts; remote from such intense malarial influences, and where cases of periodical fevers are almost entirely unknown, that such an admixture of the two poisons ever takes place. It would be singular indeed if the malarial germ of *Leveran* had become so intimately related to the *Bacillus Typhosus* of *Klebs* as not to exert its baleful influence, except in conjunction with it.

Furthermore, it would be reasonable to suppose that the two poisons, acting in conjunction with each other, would produce a far worse disease than either one of them acting alone. If we can conceive the co-existence of the two poisons in all their wonted activity and tendency to almost incomprehensible rapidity of self-multiplication, we would naturally conclude that the system would be overwhelmed by a malignancy that would be terrific in its effects, and that a disease would be engendered that would be utterly intractable to remedies, and speedily fatal in its termination. We would indeed be justified in this conclusion, unless it could be demonstrated that these two poisons are antagonistic or antidotal to each other. The light of future investigation may reveal the fact that the "*Bacillus Typhosus*" is supplanting the malarial germ by absorbing or de-

vouring it, and typho-malarial fever may be the battlefield upon which the active warfare is waged.

In illustration of the virulency of two poisons, operating upon the system at the same time, I will briefly allude to a sad experience I had in 1875 in the treatment of measles and scarlatina, both diseases manifesting themselves in the same patient almost simultaneously. Some of them had measles first, with all the symptoms characteristic of that disease. The disease would run its usual course until the eruption had partially or wholly disappeared; when, instead of defervescence taking place and convalescence beginning, there would be an increase of temperature to 104° or 105° , and the rash of scarlatina would appear with the characteristic throat symptoms, and all the concomitants of the severe form of scarlatina anginosa. In some of the cases scarlatina was the first disease to manifest itself, and the order of symptoms was simply reversed; only where scarlatina existed first, the two diseases seemed to merge into each other more closely, and were less clearly defined and tended more rapidly to a fatal termination. In all the cases however, the distinctive eruptions of both diseases were manifest during the course of the patient's illness. I had six cases of this character, all of which resulted fatally.

In regard to the causes of the Bellaire fever, it is patent to the most casual observer that there were several important factors in existence that may have contributed thereto, arising from the bad local sanitary conditions as well as from the water supply, the chemical analysis of which is conclusive. I am informed, however, that at the time of the outbreak of the fever, the river was at a high stage and the outlets of the sewers were entirely submerged, so that the exit of gases through those channels was effectually prevented, and in consequence of this condition, sewer gas escaped through imperfect traps in the streets, and, no doubt, in many instances gained entrance into the houses. The stench of these sewer emanations was preceptible to every one, and was at the time the subject of general remark. The fact of the river being high, and the volume of water largely increased, would militate against the theory of the water supply being alone accountable for the production of the disease; for it must be conceded that when organic matter is largely diluted it greatly lessens its chances of producing disease, and while it is self-evident, in view of all the circumstances, even without the aid of a chemical analysis, that the Bellaire water cannot be otherwise than contaminated in the highest degree, yet we must admit that the greatest danger from it must be when the water is at its minimum in quantity, and the polluting substances are most concentrated. That typhoid fever may arise from the effluvia from sewers is a doctrine very generally admitted by sanitarians, and is supported by the strongest evidence. This cause was recognized as the chief factor in the causation of the disease

long before it was known that contaminated drinking water may produce it. "Many instances are recorded in which this fever has constantly prevailed in houses exposed to sewer emanations, either from bad sewers or from want of them, in which proper sewage has completely removed the fever."

In the report of the medical officer to the privy council we find the following statement: "In twenty-one English towns the average reduction of typhoid mortality after sewerage, was 45.4 per cent. In a case from private information, an outbreak of enteric fever in a training school was localized in certain parts of the school, (whereas the drinking water was common to all,) and was traced to imperfections in the traps in those parts of the house which were affected. In this case the drains led down to a large tank at some distance and at a much lower level, and the smell of the effluvia was so slight, that at first it was not believed that the drains could be out of order. The persistent existence of enteric fever at Eastney Barracks, Portsmouth, appears to have been tracable to sewer air driven back into the quarters by the tide, there being no traps or ventilating openings. Since October, 1878, when the drains were put in order, and better flushed and ventilated, there has been no fever. Other possible causes were carefully inquired into and eliminated." (Parkes.)

These facts seem decidedly to show a causal connection between the effluvia from sewers and excreta, and typhoid fever, and they are supported by the statistical evidence which proves that the prevalence of typhoid fever stands in a close relation to the imperfections with which sewage matters are removed.

As the deleterious effects of sewer gas are so well established, it would warrant the conclusion, that if these noxious effluvia are so potent for evil, that emanations from privy vaults and cess-pools, and from earth that has been for years saturated with excrementitious matter, can by no means be salubrious, and no doubt many of the chronic and minor ailments which afflict humanity are attributable to the inhalation of air thus contaminated.

Physicians and sanitarians all agree with one accord, that typhoid fever is pre-eminently a filth disease; and it matters not which view is held, whether it be due to a specific germ and its imperishable spores, or to the bacteria of ordinary decomposition of organic matter. If it is caused by a specific bacillus, the presence of organic matter in a state of decomposition is essential to its propagation and reproduction; serving as a pabulum or nutritive fluid, without which the germ cannot survive. Liebermeister says: "In general, we can say that the disposition of any locality to an epidemic of typhoid fever depends largely upon the extent to which the inhabitants breathe or drink the contents of their privies." The truth of this assertion has been proven by volumes of testimony and can no longer be doubted. The preventive measures may be therefore quite easily formulated, namely: to keep the air we

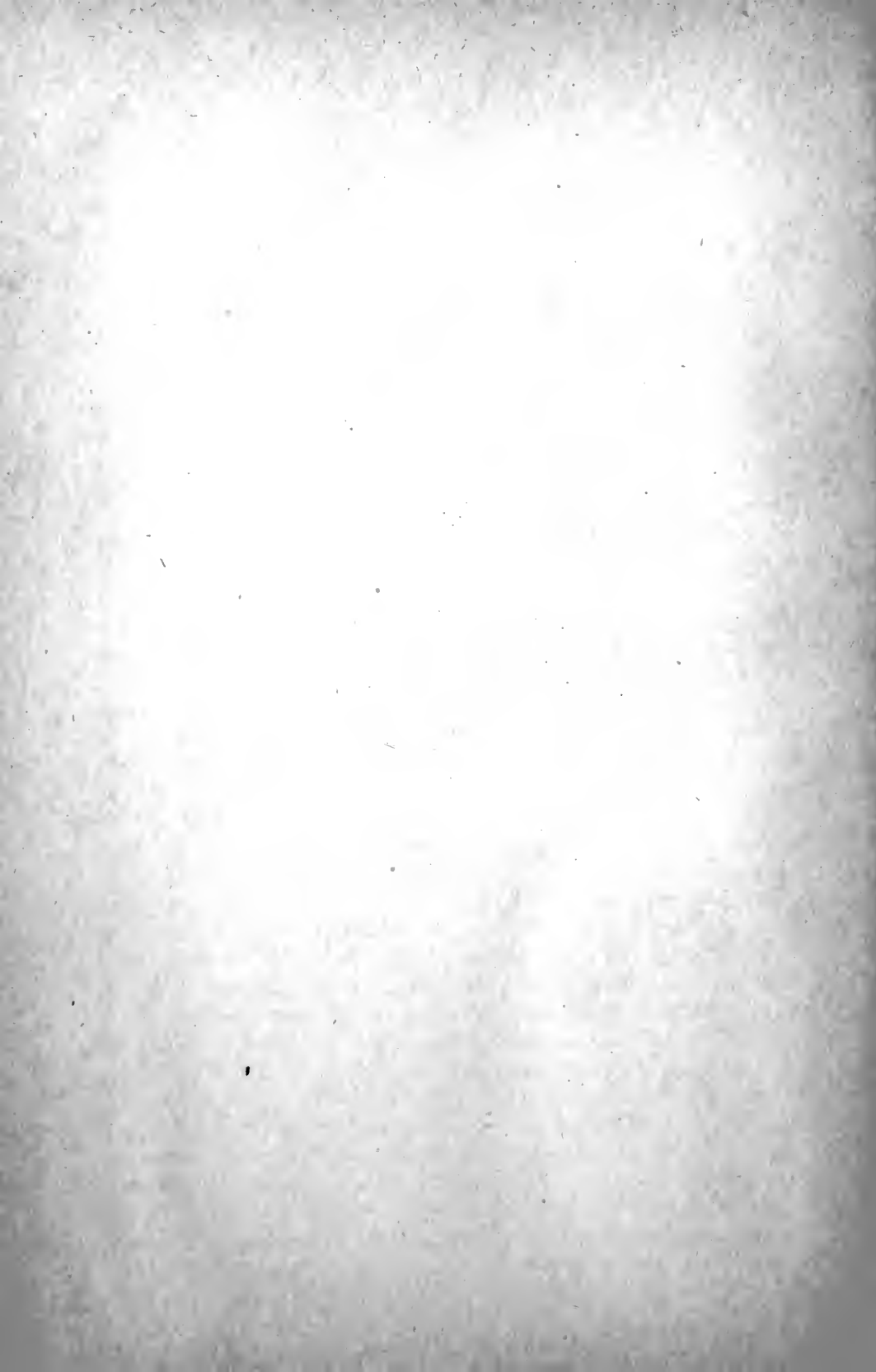
breathe and the water we drink free from all contamination. In order to accomplish this it becomes necessary that a constant warfare should be waged between mankind and filth. Wherever they dwell together in harmony and peace, there disease exerts its fullest sway, but where strife and contention exist between them, and filth is effectually exterminated, there healthfulness reigns supreme.

SUGGESTIONS ON HEATING AND VENTILATION.

BY

T. CLARKE MILLER, M.D.,

Chairman of the Committee on Heating, Ventilation, etc.



SUGGESTIONS ON HEATING AND VENTILATION.

BY T. CLARKE MILLER, M. D.

Among the problems which present themselves to the practical sanitarian, probably none are of greater importance, and few, if any, are surrounded by so many hindrances to practical solution as this—How can we secure an artificial climate indoors, possessing the conditions favorable to health, while the temperature in the open air ranges from zero downward?

A comfortable degree of heat is the most palpable requirement, and is the first, and usually the only demand of a vast majority of our people of inferior intelligence, and even those of average or fairly good information are indifferent to the qualities of the air in other regards.

The most imperative demand, in a hygienic sense, is that the air should be free from a dangerously large admixture of poisonous gases, and imponderable products of physiological and pathological decay.

People may be brought to realize the dangers to be apprehended from the adulteration of food. It is more difficult, though it may be possible, to bring them to a practical recognition of the peril that lurks in water derived from a polluted source; but the air, which many times a minutes enters the body through most delicate organs and comes in almost immediate contact with the warm life blood, is rarely thought of with misgivings, unless its *temperature* becomes uncomfortably low or high.

Now, low temperature may be compensated by proportionately increasing the clothing, and high temperature, within climatic limits, by lightening the covering of the body, but *polluted air* is utterly irremediable. The gigantic initial task of the sanitarian is to impress upon the people the fact that the impalpable substance which woe in the zephyr and spurns in the blizzard, may, in its mood of quiet and sensible nonentity, teem with dangers to health and life—that the air we breathe, though the breath of life, when once inspired, becomes the very atmosphere of death when re-breathed.

It is curious and startling, when we remember the disgust awakened by ordinary and comparatively innocent excrementitious products, to see the utter and unconscious indifference to an atmosphere loaded with physiological waste and robbed of its life conserving oxygen, which has run the gauntlet of foul eructations from disordered and maltreated stomachs, viscid bronchial mucous, and throats and noses riddled by nameless diseases.

Fresh air is accessible in great profusion out of doors, but the other conditions, those most sensible, and consequently most urgently insisted on, cannot be enjoyed in a natural climate, at or below zero. The sensations awakened by low temperature, have almost, if not quite, as imperious dominion as the demands of the organism for food.

A comfortably high temperature is a very great hygienic necessity, but it is a need that will not fail to urge itself. The sanitarian must be able to make a local climate—within walls—which, while it is comfortably warm, shall also be safely pure. He must give *voice* to the speechless requirements of good health; we can better afford to lack in heat than we can to abound in poisoned air.

The *speculative* sanitarian recognizes the necessity for pure air, he may be able to give the exact components of a wholesome, respirable atmosphere, or he may even have the skill to make a qualitative and quantitative analysis of impure air. The *practical* sanitarian must *know* and *be able to show how* impure air is to be disposed of and replaced by pure and comfortable air.

Ventilation and warming are wedded “for better or for worse;” the principles involved in either can not be elaborated while the other is ignored or neglected.

A most pressing necessity exists for the application of correct principles to the warming and ventilation of buildings occupied by human beings, and perhaps more especially, to that class of structures designed for the occupancy of a large number of people for many consecutive hours, such as school houses, churches, court houses, legislative halls, etc.

It would be interesting to study the agencies of foul air in warping characters in spite of otherwise excellent educational facilities—in inaugurating fantastic theological deviations, in confusing juries and witnesses, and even judges—and in bringing about unwise or pernicious legislation; but the mental and moral aspects of sanitary science are not under consideration, but in the name of the most advanced sanitary thought may we not stake off a claim in the mental and moral field?

The conservation of health and economy in human life demand something better than we have had; and the necessity of educating the people would suggest that every place of public entertainment or assembly, and most certainly every institution that is under the control of the State or that aims at the enlightenment of the people, should, in the location, construction and surrounding of its buildings, be an object lesson in sanitary science.

In setting forth some of the simpler principles, underlying proper and effective methods of warming and ventilation, I shall not concern myself much about originality, such concern would be useless since I only propose to formulate familiar elementary principles. Repetition may be as forcible and effective as the enunciation of new truths; reflected light, though it may lack

the penetrating intensity of direct rays, may illuminate places not reached by the latter.

There is no way at present known by which we can purify polluted air and render it again fit to be breathed. The ventilation of a room is the process of removing the air which has become useless and hurtful by reason of its foulness, and replacing it by air which satisfies the requirements of healthy respiration; the poisoned air must be taken out and fresh air admitted. The practical results of this double process, under the most favorable circumstances, are to dilute the foul air and maintain a state of tolerable foulness or proximate purity. There is only one source of supply, namely, the great mass of the atmosphere which is drawn from at some point, outside the building, not liable to local, contaminating influences. Special care must be taken that this fresh air receive no added constituents, and that it be deprived of none of its native qualities in its passage to the rooms in need of it. Sufficient openings must be provided for the admission of fresh air to the required amount as well as for the exit of an equal volume of foul air displaced. Many a heating apparatus has been rendered valueless, even as old iron, and tons of fuel have been destroyed in the attempt to warm buildings by driving hot air into rooms already as full as possible, and without provision for the escape of air in as great amount as that sought to be driven in. The method of heating by stoves, placed in the rooms to be warmed, usually ignores the necessity of a supply of fresh air; with a close stove, of course, the only dependence is in cracks about the windows and walls in general, and also to the more or less frequent opening of doors or windows. An open stove takes out a considerable volume of air which is replaced by windows, doors and crevices, the air taken in is cold while that taken out is warm, consequently the purer the air in the room the colder it is. An open stove is better than a close stove, and as even a close stove takes out some air to supply its draft, it is better than surfaces heated by steam or hot water which supply heat by direct radiation, but neither take out foul air nor bring in fresh. This being true, the direct radiation method of warming, while it may answer, in a manner for rooms little used or having open walls, is poorly, if at all adapted to well closed buildings, occupied by large numbers of people. The sanitarian, therefore, cannot countenance the warming of school rooms, churches, court rooms, legislative halls, etc., etc., by stoves, and even less by direct radiation, alone, from surfaces heated by steam or hot water.

In order to ventilate a room, properly, we must provide for the discharge of air as rapidly as the process of contamination goes on; the rapidity of this process will depend on the size of the room and the number, proportionately, of its occupants. This also contemplates, necessarily, the admission of a like volume of fresh air.

In order that a room may be properly warmed the fresh air must be warmed before being admitted to the room, in volume fully equal to the air taken out, that is, as rapidly as contamination takes place.

The heating apparatus should be of sufficient power to warm all the air necessary in order that the air in the rooms may be kept fresh. It should present a large heating surface to the air, and should be only moderately heated. It is probable that iron made red hot does not, as some suppose, allow the gases of combustion to pass through its pores, yet there is no doubt but air may be rendered less wholesome by passing over surfaces heated to redness or whiteness. If there should be insufficient surface it must be over heated in order to produce a comfortable degree of warmth in the rooms.

All this contemplates ample communication with the outside air, as well as pipes and registers abundantly large.

Having provided for an abundance of warm, fresh air, it is most economically admitted at or near the floor. It is not absolutely imperative that this should be the case, yet, under certain circumstances, it is very desirable that, for a short time at least, the body or feet should be exposed to a degree of heat greater than the general temperature of the room. The warm air naturally rises without much disposition to diffusion until it reaches the ceiling, and as it parts with its heat it becomes relatively heavier and is disposed again to descend. As the air becomes foul it also becomes relatively heavier. The ventilating openings should consequently be at the floor in order that the foulest air as well as the coldest may be taken out and replaced by the warmer, purer air in the higher parts of the room.

Simplicity in principle will be largely favorable to satisfactory results, as you cannot secure a philosopher and mechanical engineer for every heating apparatus. The movement of air through the rooms should be in obedience to natural law—as nearly as possible, self-acting or automatic; ventilating flues in their capacity, must be proportioned to the size of the rooms and the number of occupants, and must have a good draft. It must not be presumed that all flues will draw. The residue of heat remaining in the air when it is taken out of the room will favor its ascent in a flue; this will often, perhaps generally, secure the necessary draft, but this is sometimes to be further assisted by a gas jet burning in the ventilating flue, or a small independent heater placed at the base of large flues having a large amount of work to perform. Some such provision should be made in order that it may be available in certain states of the atmosphere unfavorable to the normal action of the flue, and it must not be forgotten that success in warming, as well as in ventilation, will depend on the efficiency of the flues, as the aspirating power of the ventilating flues is ultimately felt at the opening which admits fresh air from outside the building.

An ordinary school room contains about 12,000 cubic feet of air space. If we allow twenty-five cubic feet of air to a scholar per minute, forty scholars would use and disable 1,000 cubic feet per minute, and would render the whole amount of air, in the room, unfit for use in twelve minutes, and unless the ventilating flues have the capacity for removing 12,000 cubic feet of air five times every hour, the air will progressively become impure. I understand well enough that I am not over-liberal in the size of the supposed room, in the allowance of air to each scholar, and that I *am* over-liberal in the number of scholars, but sanitarians may well be happy when our schools come up to these minimum requirements.

In dwellings a combination of the direct and indirect methods of heating may be allowed, but the direct method alone is intolerable, even then, while in rooms where a large number of people are gathered and remain for hours, the direct method cannot be tolerated at all unless to supplement the indirect method after a sufficiently rapid change of air has been secured.

SUMMARY.

(1.) Warming and ventilation are inseparable questions from a hygienic point of view.

(2.) The air in a room when foul, can only be made pure by displacement.

(3.) Air cannot be taken out of a room more rapidly than it is replaced by air admitted to the room.

(4.) Warm air cannot be driven into a room in greater quantity than the volume of air taken out.

(5.) The air in an occupied room, heated by stoves or other radiators placed in the room, is made warm at the expense of purity, or pure at the expense of warmth.

(6.) A room properly ventilated must discharge air as rapidly as contamination goes on, and receive an equal volume of fresh air.

(7.) A room properly warmed must receive warm, fresh air as rapidly as the foul, chilled air is taken out.

NOTE—A room of the size indicated would be a very fair size for 136 pupils; but practically it will often be necessary to admit a greater number. Experience teaches us that, frequently the school year closes with rooms to spare, yet the succeeding year opens with a lack of rooms; so that it is impossible to absolutely fix, within proper sanitary limits, the number of scholars to be admitted to each room.

It would be desirable to change the air more rapidly than indicated above, but practically it is a question whether this can be done and yet maintain a comfortable temperature in very cold weather, with stormy winds, unless we introduce a heating apparatus, which would seem to be out of proportion to the space to be warmed.

It is possible to present a very imposing array of figures, setting forth the amount of air space required, the size of ventilating flues, the rapidity of upward currents in these flues, etc., etc., all based on a basis of the percentage of the percentage of CO_2 present—or which, at least, ought to be present, if the producers accomplish what is to be expected of them. But a lively north-wester, with the thermometer 12° to 15° below zero, is liable to disturb the relations of these figures, and bring about the necessity of a new arrangement which shall take into account the extent of heating surface required and the degree to which it must be brought in order to supply the requisite volume of air, warm enough to enable us to enjoy and appreciate its freshness. While we aim at the ideal, let us by all means, not fall to secure the limit of the possible.

(8.) The heating apparatus should offer, to the air passing through it, a large surface, moderately heated, in order that a large volume of air—warm rather than hot—may enter the rooms.

(9.) Warm air, owing to its relative levity, should be admitted at, or near, the floor.

(10) Foul air, owing to its relative gravity must, together with chilled air, be taken out at the floor.

(11.) Special care must be taken that the fresh air is not contaminated before entering the building, or at any point in its passage to the rooms.

(12.) The movement of air through the rooms should be in automatic obedience to natural laws.

(13.) The capacity of the ventilating flues must have reference to the size of rooms and the number of occupants.

(14.) A good draft must be secured in ventilating flues, not only to take out foul air, but to bring in fresh, warm air.

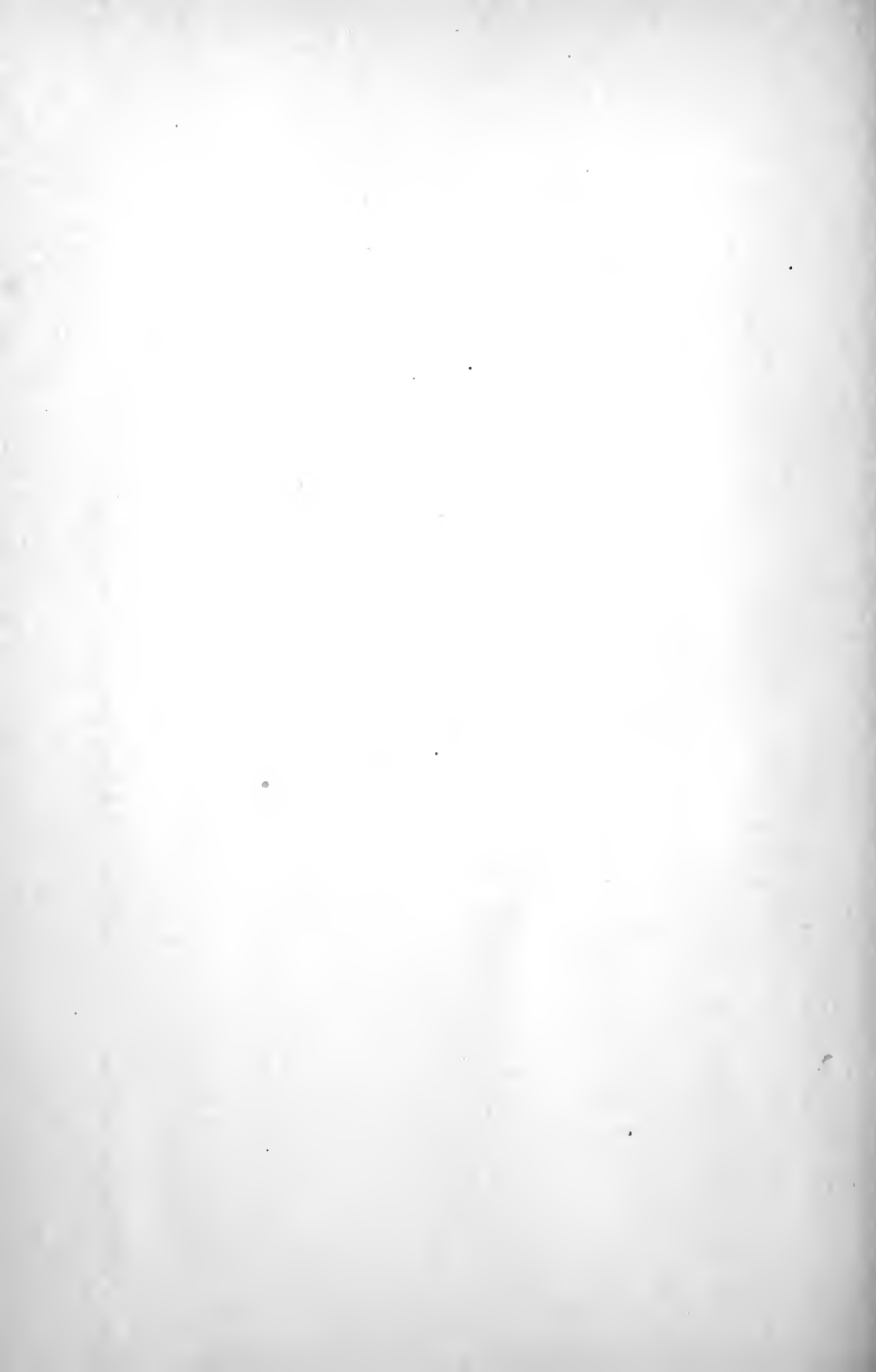
(15.) At least twenty-five cubic feet of air, per minute, should be supplied to each occupant of a room.

REPORT ON WATER SOURCES, SEWERAGE, ETC.

BY

H. J. SHARP, M.D.

Chairman of Committee on Water Sources, Sewerage, Drainage, etc.



REPORT ON WATER SOURCES, SEWERAGE, DRAINAGE, AND DISPOSAL OF SUBSTANCES INJURIOUS TO HEALTH.

BY H. J. SHARP, M.D., LONDON, OHIO.

The necessity for a supply of pure water for the various purposes of domestic use is engaging, more and more, the attention of sanitarians and physicians, and even the laity in general.

When we consider that a large per cent. of all preventable diseases may be propagated through drinking water, and the manifold sources of contamination of this common potation, then becomes apparent the importance of securing the purity of our water supply.

The sources of water supply for the use of families may be grouped as follows:

- 1st. Springs or fountains.
- 2d. Wells.
- 3d. A system of water-works.
- 4th. Cisterns.

1. SPRINGS.

These are found in many parts of our State, and often supply a pure, sweet water that is well adapted to all uses of the family, while in some instances they are impregnated with minerals, that make them esteemed as remedial agents in certain forms of disease. The supply of water from this source differs in no essential from that of wells, and is subject to all the contaminating influences that affect the latter, hence whatever may be said of the pollution of the latter will apply to the former.

2. WELLS

Are the most common and generally available of all sources of water supply for family use. When removed from contaminating conditions, they supply a pure and wholesome water, potable and well adapted to all household purposes. The ordinary method of constructing them, however, renders them readily subject to conditions of pollution, and thus they may become a source of sickness to those using from them. For this reason there is a growing skepticism among sanitarians that tends to taboo this common source of drinking water, as unfit for the use of communities of numerous population, and

there is a demand for some other method or system of supply; hence the question of water supply of large towns and cities has become an important one, and will, doubtless, demand our careful consideration as conservators of the public health.

As ordinarily constructed the well is nothing more than a hole in the ground that acts as a receptacle for the surface drainage, attracting the moisture and water of the soil for a distance surrounding, in direct ratio to the depth. The well is often located in the lowest ground, thus affording every advantage for drainage into it, and in many instances there may be found within a radius of 70 feet, with the well as the center, the privy vault, stable, cow shed, garbage heap, etc., and, perhaps, the place for emptying all liquid waste from the kitchen and wash room. When the soil becomes filled by copious rain falls these impurities are leached through the earth and find their way naturally into the well.

It is a popular belief that water by leaching through the earth purifies itself. This, to some extent, may be true. Whatever is held in suspension may be separated by this process of filtration, but those substances that are held in solution may remain with all their active properties, as has been established by careful experiments by competent observers, after percolation through the fine sand or gravel to a distance of two hundred feet or more. Indeed, it is doubtful if any system of filtration will deprive water of certain forms of disease germs. A water may be clear, sweet and without perceptible odor, and at the same time be so polluted with nitrogenous matter as to cause sickness to those using it. Again, the fact that persons may for a time use water without manifesting any symptoms of disease, may not be a proof of its purity, for the same persons when the tolerance of their systems may be lessened by other causes co-operating, will give way to a diarrhoeal affection or to a continued fever, the germs of which may be found in the same water.

It is not very unusual to find the water of "the best well in town, sir," upon chemical examination to contain chlorine, free, and albuminoid ammonia in such measure as to condemn it for drinking purposes. In old communities, thickly settled, I doubt, if the water of ordinary wells is, during a long continued drought, free enough from impurities as to make it allowable for family use. From careful observations, embracing a considerable period of practice among numerous clientille, among whom malarial affections have largely prevailed, I am convinced that a very large per cent. of the sickness is due to use of impure water.

During a season of drought when the water is scarce and wells easily pumped dry, the continued fevers made their appearance among those who, up to this time, may have known little of sickness. In a community of several families, in almost every family, may occur cases of some fever, and upon examina-

tion the same conditions will be found to affect their water supply, viz.: The wells will be found of about an average depth, being supplied from a common subterranean water bed, and the water at a low stage in the well. I have no doubt but that chemical examination would reveal a bad water in all. If families must depend upon wells for their water supply, I think it would afford some protection against pollution to adopt a different method of construction from that in common use, which consists of a hole in the ground, with a stone or brick wall. In some localities drove wells are found successful. These are effective in cutting off contamination from surface drainage, and if, as is practicable in some places, they be sunk through the first water bed, that often averages depths of eight feet to sixteen feet, to a lower bed, a water may be procured that would be little liable to pollution.

If wells be dug they should be walled by some impervious method. A convenient and not very expensive method is to line them with sewer pipe. These can be set into each other and cemented and form a lining that is impervious to seepage, and will cut off all surface drainage if pains be taken to surround them with well tamponed clay.

If the subterranean water-bed that affords the water supply for the wells is found at considerable depth, and is covered with thick strata of clay, there will be little fears of contamination when the above plans of construction are observed, but when, as in many localities, the water-bed that supplies the well is found at a depth of from eight feet to eighteen feet there is great danger, especially in thickly settled communities, as in towns or cities, that this source of supply will become polluted from the surface water finding its way into it through seams in the superimposed clay. Under these circumstances it becomes necessary, in order to secure a pure water, to bring the water from a distance by means of some system of

3. WATER WORKS.

Most of these systems contemplate taking the water from an adjacent lake or river, and by means of a plant of well constructed machinery to pump it into a reservoir, whence it is distributed to consumers by means of properly constructed conduits. If care be taken in securing an unpolluted supply, a pure water may be procured by this method, but if the fountain of supply becomes polluted the evils resulting from it may become wide-spread, as has sometimes happened when an infectious disease has been conveyed to a large number of persons from using the water thus supplied from a polluted lake or stream. Fresh in the minds of physicians and many of the laity, is the case of Plymouth, Penn., where, from a single case of typhoid fever, excreta from which was washed by the melting snow into a stream supplying a portion of the town with drinking water, there resulted over 1,150 cases with a large

number of deaths. But for the supply of town and cities, as our country grows older and the population of such communities increases, some system of water works will be necessary, and, doubtless, at no very distant day, the consideration of the question of a pure water supply for such communities will constitute an important work of the board.

4. CISTERNS.

These are limited reservoirs for the collection of rain water for domestic purposes. This water subserves many important uses, but can never come into very general use for drinking purposes, and as cisterns are usually constructed, should not. Cistern water undergoes a process of decomposition by changes that take place in the organic and inorganic elements contained, and, owing to the want of free access of oxygen to its particles, is rendered unfit for drinking. No water should be used for drinking without being exposed through agitation to oxygen; and as cisterns are found without, in many instances, any adequate ventilation, this cannot be accomplished.

Closely related to the water supply of the family and community is the subject of

SEWERAGE AND DRAINAGE.

Any system of sewerage for town or city, presupposes an adequate and constant water supply. No system of sewerage will prove satisfactory without a sufficient supply of water, not only to flush at intervals, but to constantly furnish a flow or current, in order to prevent accumulations.

A dry sewer is simply a blind cess pool for the accumulation of filth, which, after undergoing decomposition, will give rise to emanations of sewer gas that will be attended with evil results to those whom it was intended to benefit. All sewers should be built so as to be impervious to water, to prevent any contamination of the surrounding soil by the seepage of their contents, and should be provided with competent traps and catch-basins so constructed as to prevent the escape of recurrent gases; and, it would, doubtless, be safer if all sewers of considerable magnitude were provided with ventilating flues, carried to such a height as to dissipate the gases, escaping into the air above all buildings. By this plan, I think, the atmosphere of cities might be much improved.

DRAINAGE.

The subject of house and soil drainage is a very important one, both from a sanitary and economic point of view. While for the sake of architectural effect, and to provide a system of plumbing, great expenditure may be made, but little attention may be given to drainage for a building and premises; in fact, few dwellings can boast anything like a perfect system of drainage. There is, perhaps, no more important part of an improvement as concerns the

health of families, than some system of drainage to carry away the liquid waste and soil water of a dwelling and premises surrounding. It is not unusual, perhaps, it is the rule, to find a dwelling has no system of drainage whatever, or if there be one, we often find the waste from the water closet and sink carried through pervious tile, which allows seepage into the sub-soil, and, perhaps, into the well, or, if the tile be impervious, there are no traps and recurrent gases find vent into the kitchen or cellar or other part of the premises often causing typhoid fever, diphtheria or other infectious disease.

The first principle in the erection of a dwelling should be to provide adequate means for carrying away all waste water, and protection, as far as practicable, against surface moisture.

Instead of the extra expense for architectural effect, it would be well to apply some of it in preparing for the foundation of the building. When adequate drainage can be secured, I believe the excavation should extend under the entire house, and the floor of the excavation, first covered with asphalt, and this, again, covered with concrete. By this method the entire floor beneath the building will be impervious to moisture.

Outside, and a few inches below the foundation wall, a tile drain should be laid, and this tile carried into a sewer-pipe drain. No drain that connects with the cellar or other apartments of the dwelling, or with any sink, should be located, however well trapped, unless there is a soil or ventilating pipe having connection with the drain below the trap and carried into the air above the building. With such a pipe the danger of forcing the traps by recurrent gases will be averted, these gases being carried through the ventilating pipe and dissipated at such elevation as to cause no harm. With such system adopted in making cellars or basements, complaints of their being damp would cease, I think. The surrounding grounds should be thoroughly drained by laying drain-tile through them in order to carry away the soil water. In this way great protection would be afforded to both the well and cellar, and our homes much improved and rendered healthier.

As an economic industry the drainage of soils has made great advancement in recent years. In many counties, the manufacture of drain-tile has become a staple industry, and employs much of both capital and labor. Every season witnesses the laying of miles of this tile in many counties, with marked benefit to both the farming interest and to the health of the people.

Lands that have laid waste, and, perhaps, been covered with water for many months of the year, are rendered arable and become the most productive and valuable.

Every year thousands of acres are redeemed from waste and barren by this industry, and thereby the value of real estate is much increased and the prevalence of malarial affections are much diminished.

THE DISPOSAL OF SUBSTANCES INJURIOUS TO HEALTH

Is a subject that has engaged the attention of sanitarians and health authorities recently, with much interest. The custom of dumping the waste, such as night-soil, garbage, etc., and emptying the sewage into our lakes and rivers, thereby polluting the water supply of towns and cities, must sooner or later give way to some other method of disposing of such matter.

It not infrequently happens that a city empties her sewage into lake or river, to be pumped up and served to her citizens in their drinking water, and cities and towns situated upon our rivers are obliged, in many instances, to use water that is badly polluted by the sewage and filth of cities situated on the same stream, above, and in many instances, at such slight distance that but slight purifying effect is had upon the water by the distance the water has to run after receiving the polluting matter.

The feasibility of disposing of the night-soil and garbage of cities and towns by combustion has been much agitated among health authorities recently, and we hope to soon see this plan practically demonstrated through the enterprise of the city of Wheeling, W. Va., the wide-awake health authorities of which, have induced the city council to build a furnace for the purpose of incinerating the solid waste of that city. This furnace is now about completed, and soon will be put in operation, and I hope will prove a success.* For a very intelligent description of the interesting experiments made under direction of the health department of the city of Wheeling, that led to the erection of this crematory, I would refer the reader to a communication from Dr. Geo. I. Garrison, health officer of Wheeling, included in the report on the water supply of Bellaire, Ohio.

Much has been said and written by sanitarians upon this subject, recently, and it only remains for its success to be made apparent in a few instances, to bring it into general use, I think. The subject, when the records are referred to, will be found an old one. In the Mosaic records, we read: "And the skin of the bullock, and all his flesh, and his head, with his legs, and his inwards, and his dung, shall he carry forth without the camp, and burn on a fire of wood," again, "And one shall burn the heifer in his sight; her skin, and her flesh, and her blood, with her dung, shall he burn."

In this, as in many other things, Moses proves himself a very intelligent sanitarian. And if by this judicious use of fire and water, we should condescend to imitate the example he inculcates, much benefit may result to the people, and a higher order of sanitary observances be attained.

*Since writing the above the furnace has been completed and is a success. It was found, upon testing, to consume night-soil and garbage rapidly—the carcass of a horse in twenty minutes.

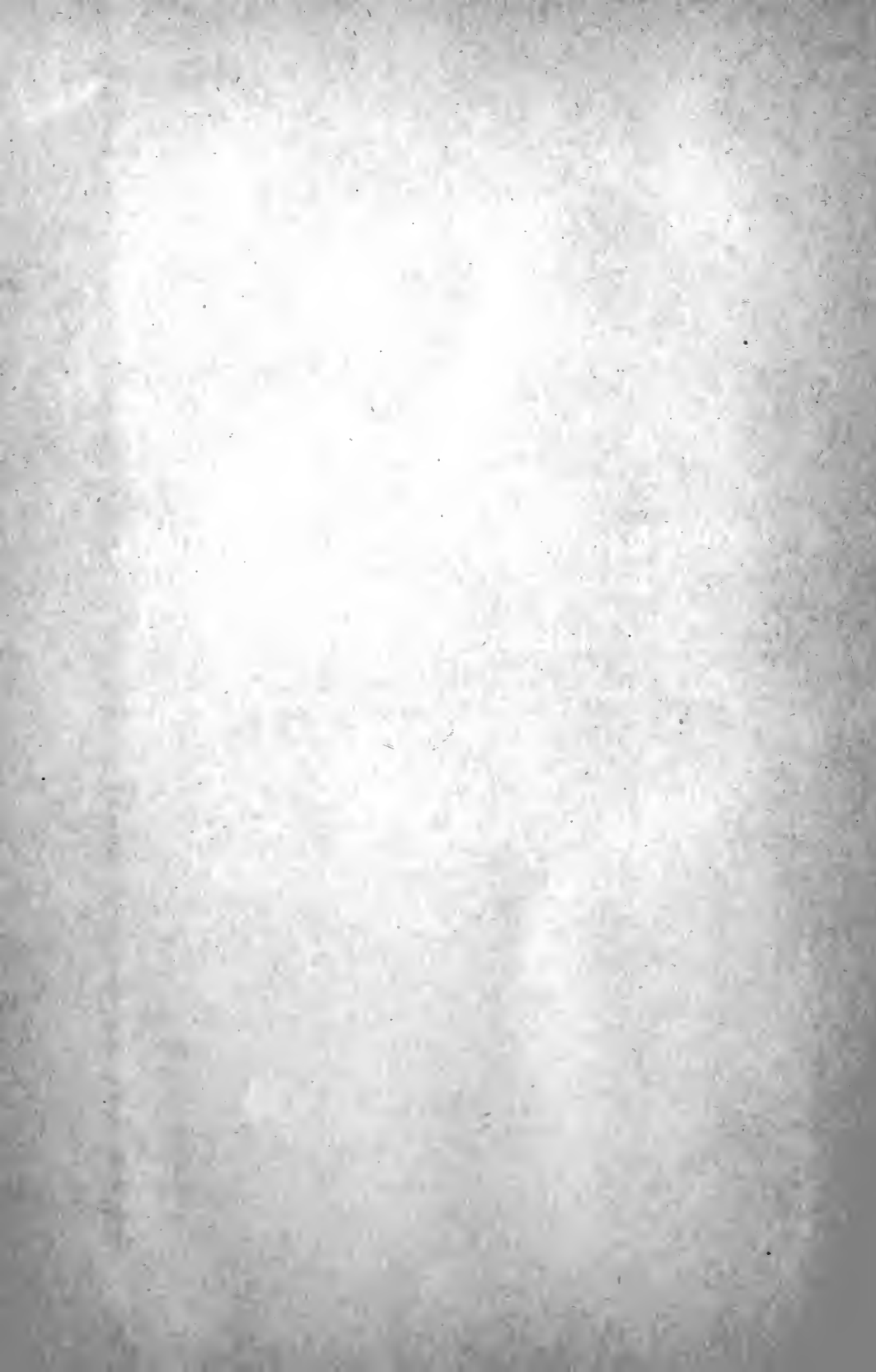
REPORT ON SCHOOL AND SCHOOL HYGIENE.

BY

JOHN D. JONES, M.D.,

Chairman of the Committee on Hygiene of Private and Public Buildings.





REPORT ON SCHOOLS AND SCHOOL HYGIENE.

BY JOHN D. JONES, M. D.

GENTLEMEN: As chairman of the Committee on School Hygiene, I beg leave to present the following as my report:

The welfare of children is of great importance to the nation; as our future strength, both mental and physical, depend on the well-being of these developing men and women.

The first idea generally is, in regard to the school-room, that the mind only should be cultivated there. This is a great mistake, as without health, the mind is unable to grasp the things required; the cultivation of the mind and body should go hand in hand.

To have perfect health, we must have good sanitary surroundings. Good ventilation, heating, lighting, proper sewerage, water supply, correct construction and placing of school furniture, proper regulations as to studies and hours to be employed, exercise, the recess, and the cleanly condition of grounds and school-rooms are all subjects that have to do with the health of pupils.

VENTILATION.

The subject of school ventilation is a matter to which much time and thought has been given. Prof. Hough, of the Miami Medical College, has made some important examinations in regard to the sanitary condition of the schools in Cincinnati, which compare favorably with those of other cities. It was found that there was inadequate air-spaces and ventilation in the majority of cases. After measuring the air-space of 265 rooms, it was discovered, that in some cases only 100 cubic feet of air was allowed to each pupil, including the space occupied by the body and his share of the school-room furniture. The proper amount should be not less than 300 cubic feet to each person—only 29 rooms, from the number examined, allowed the full amount. The measurements were not confined to the over crowded school rooms, so the average will be correct for all the Cincinnati schools.

Each respiration of man throws off 12-10 cubic inches of carbonic acid gas, which has narcotic effects. A pupil respires about 450 cubic inches of air in one minute, which is converted into air that poisons the surrounding atmosphere.

The analyzation of Cincinnati air in densely populated parts of the city, shows the following :

	Parts 100,000.	
	By volume.	By weight.
Nitrogen	78.031	76.365
Oxygen	20.509	22.677
Vapor of water	1.399	.870
Carbonic acid (CO ²).....	.056	.035
Ammonia .....	.004	.003
Other vapors .....	.001	.003
	100.000	100.000

The importance of proper ventilation is readily seen, as 1-10 per cent. alone of carbonic acid gas will gradually produce headache, and it is a deadly poison. The investigations made in regard to ventilation and heating, have resulted in the decision that "heat" is the proper means by which space must be warmed and ventilated. In heating by direct radiation, the air present is warmed over and over again. Whereas, air brought from the outside, being heated and then thrown into space, becomes much more wholesome. The proper placing of ventilators, at the bottom of a vent pipe, which passes along the side of the flue and receives the heat as it is carried upwards, will carry off the impure air with great facility. As the subjects of ventilation and heating properly belong to another committee, I stop at this point.

LIGHTING.

The proper lighting of the school-room is a matter of the greatest importance, as Dr. E. Williams, of Cincinnati, has said, "The principal reasons for all difficulties of the eyes of school children are too many hours of daily study, the consequent long confinement in the heated air of the school-room, with too little recreation in the open air. Then, the arrangement of many of the school-houses is without sense, and ruinous to the eyes of the children; some of the rooms are too dark and others are arranged with seats facing the direct light of the windows, both of which are very trying to the eyes even when not over-taxed." It is my firm conviction that the health of most of our school children is damaged, and their subsequent usefulness impaired by crowding too many studies upon them, and confining them to their recitation rooms too many hours during the day.

The colors used in the school-room should never be glaring, but of a soft toned character; for the walls, a soft bluish gray or light olive green; the ceiling, white; floors dark, and without a shining surface. In fact, nothing should be glaring in color about the school-room. The placing of the black-boards is another use of color that is often misused. The surface should be

dead black, and the board so placed that the light should never come from the sides, as between two windows; unfortunately most of our rooms are lighted from but one side, so it is difficult to place the board properly. The light by rights should come from above, as in a picture gallery. In the construction of new buildings, these matters should be studied into.

I propose this coming winter to have an examination made of the eye-sight and the general condition of the pupils, at this point, in regard to health. This will be of value in deciding concerning lighting, placing of school furniture, length of study hours, etc.

SEWERAGE.

Proper sewerage is of vital importance. The study of sanitation shows conclusively that much sickness is produced by the imperfect disposal of refuse matter. In cities properly sewered, and where the plumbing of school-houses is properly looked into, little danger is to be expected. But in the country, and some villages the sanitary condition of the grounds and school-houses, is, I regret to say, of the worst character.

For instance, the vault and well are often very near together, sometimes the vault is elevated, while the well or spring is in the hollow near by. Typhoid fever, diphtheria, and similar diseases are produced by such conditions. A little thought in such matters would save much trouble.

WATER SUPPLY.

The water supply frequently is contaminated, as in small towns and the country, well and spring water is used, which has been contaminated by an adjoining cess-pool or privy vault. Too frequently, the well water so cool and clear, contains germs of disease, as the vein from which it springs also carries the seepings from some filth near by. Having had occasion to investigate the causes of a number of typhoid fever cases, I found that the cause of a large majority of the cases, was the result of contaminated water supply, and in most cases, the water had been taken from wells or springs. I would recommend that school houses situated in villages and the country, should have properly constructed rain cisterns to contain the water to be used by the pupils.

SCHOOL FURNITURE.

The advance made in the improvement of school furniture is marked. There is no reason in this age, that school desks and seats should not be used that answer all the requirements of the pupil in regard to comfort. The height of the seat at the front should vary from twelve inches to seventeen inches; height of the top from twenty-two inches to thirty-one inches; width of seat from ten inches to fourteen inches; width of top from twelve inches

to sixteen inches. These measurements will suit children from the ages of six (6) years to nineteen (19) years. The backs should be sufficiently curved to suit the natural spinal curve. It has been contended that straight-backed seats are the best suited, and in Germany all school seats are so made. The school bench is not the most comfortable, so why not have as much comfort as possible (which cannot be gotten from a straight-backed seat) and at the same time not endanger health.

STUDY HOURS.

Many opinions have been advanced in regard to the length of the hours for study. The time should be suited to the age of the pupils. In this State seven (7) years being the minimum age of public school pupils, I consider at this time of life one term of not more than three (3) hours a sufficient time for study, and for pupils from thirteen (13) to eighteen (18) five (5) hours of study is enough, as we know the old maxim "all work and no play," etc., to be true. Feeble constitutions and diseases of nervous character are decidedly on the increase, being the result of too close attention to study, long hours of confinement, and bad ventilation. How much more important to the growing child is the fresh air and freedom, than the extra knowledge gained during the long last hours—and to the tired teacher, who has been on the strain all day.

Charles Kingsley, the true friend of children, and who sympathizes with them, in one of his stories, gives an account of developing childrens' minds which corresponds with the trials of many little ones. "These were as pretty little children as you could wish to see, and might have been still, if they had only been left to grow up like human beings, but their foolish mothers and fathers instead of letting them pick flowers and make mud pies, and get birds' nests, and dance around the gooseberry bush as little children should, kept them always working, working, learning day lessons all week days, Sunday lessons all Sunday, weekly examinations every Saturday and monthly examinations every month, yearly examinations every year; everything seven times over as if once was not enough, and enough is as good as a feast, till their brains grew big and their bodies grew small and they were all changed into turnips with little but water inside, and still their foolish parents actually pick the leaves off them as fast as they grow lest they should have anything green about them." One can hardly read this without calling to mind some little turnips.

RECESS.

The "recess" has been a bone of contention for some time. A general recess is certainly not a good thing, as usually the weak ones go to the wall. The great number of pupils in large schools attending to calls of nature at the same time is not conducive to modesty. The exposure during inclement

weather often results in bronchitis, pneumonia, rheumatism, chill-blains and similar troubles. I would recommend a large, well heated and ventilated room to be used as a reception and play-room during damp and cold weather. Also to regulate the recess, so as to have, not too many at one time, and to have ages suited to each other. Shorter hours and no recess would be by far the best. A child should never be refused, if it desires to leave the room, as many serious troubles arise from too long retention.

The hurried manner of eating cold luncheon or hot dinners is the cause of dyspepsia, constipation, etc. Two hours and a half to three hours should be given for the mid-day meal and its proper digestion. I trust that the time will come, when the meal hour will be considered as important as the hour of education, for it is the time to properly care for, and train the stomach and other digestive organs.

CORPORAL PUNISHMENT.

Corporal punishment is only for brutes, and is too often used even on them. I regret to say that this mode of punishment is still permitted in our schools. Nothing so debases oneself, in one's own mind, more than to be whipped. It has been abandoned in both army and navy on account of its debasing influence. Why should a child be subjected to that which is considered too demeaning to be administered to men? Other means should be used, but no whipping:

EXTRA INSTRUCTION.

I would suggest to the boards of education a course of instruction, that will be of great service, to be commenced in the early school days; that is, instruction with reference to emergencies. We have all noticed the great alarm among the majority of the people at the time of trouble. Why not train our children and prepare them to act when the time comes for action. Many lives could have been saved, and much suffering relieved, if the proper thing had been done at the proper time, so let us prepare the children for the future. The following are samples of some of the subjects that might be introduced into the course of instruction:

Among the most common things that occur is hemorrhage—from one part or another; but we would only deal, in this instruction, with the simple kind: always remember that the heart is the reservoir of the blood; and if there is a cut or wound, tie or make pressure between the part injured and the heart, thereby cutting off the supply. Always remember that it is harder for fluid to run up hill than down, so elevate the injured part.

Fainting is another occurrence that requires prompt action. It is the result of a lack of blood in the brain. Place the fainting person flat on the ground or floor, unfasten the clothes so that nature may be able to supply the re-

quired blood to the brain. Uses of some remedies might be added. Sunstroke, frozen members, and similar subjects might also be taken up.

Now a more serious thing, that of caring for a person exposed to death by drowning. The most simple way to instruct, would be, by practical illustrations. Let some child be requested to take the part of the patient; this will be of greater interest, and will amuse while it instructs and will more fully explain the mode of procedure. In regard to the subject of persons exposed to this mode of death, I would suggest the following instructions to be given to the schools:

First.—Remove all obstructions to breathing; cut loose the neck and waistbands. Let the person be turned face downward, with the head down hill, the person having charge to stand astride of the hips, with the face towards the head of the patient, and both the fingers under the belly; raise the body as high as possible without lifting the forehead from the ground, and give the body a smart jerk to remove the mucus from the throat and the water from the windpipe; hold the body suspended long enough so that you may have time enough to count five (5) slowly. Repeat the jerk three or four times slowly.

Second.—Let the patient be placed face downward—you maintaining your position astride the body. Grasp the clothing at the shoulder points, or if the patient is naked place your fingers into the armpits with the thumbs on top of the shoulders, and raise the chest as high as you can, letting the head rest on the ground. Keep this position until you can count three (3) slowly. Place the patient on the ground with the forehead on the arm and the neck straightened; see that the mouth and nose are free. Place your elbows against your knees and your hands on the sides of the chest, over the lower ribs, press downward and inward with force, count two (2) slowly, then suddenly let go and grasp the shoulders as before and raise the chest, then press upon the ribs. These movements should be alternated for ten or fifteen times a minute, unless breathing has been restored sooner. Use the same regularity as in natural breathing.

Third.—After breathing has been restored, then restore the animal heat. Wrap the patient in blankets. Put hot water, hot bricks or anything to restore warmth. warm the head as fast as the body to prevent convulsions. Rub the body and slap the fleshy parts. This will produce warmth. When you are satisfied the patient can swallow give hot drinks, coffee, teas, or sparingly of spirits with hot water. Place the patient on a warm bed, and let there be plenty of fresh air in the room. Keep the patient quiet. Avoid delay. Artificial breathing is of the most importance. Do not permit the patient to lie on the back, unless some person prevents the tongue from falling backward, which might produce a fatal choking. If breathing ceases give

smart slaps on the face or sudden jerks of the hair, and it will sometimes start again. Do not give up too soon, for within two hours you may be near success.

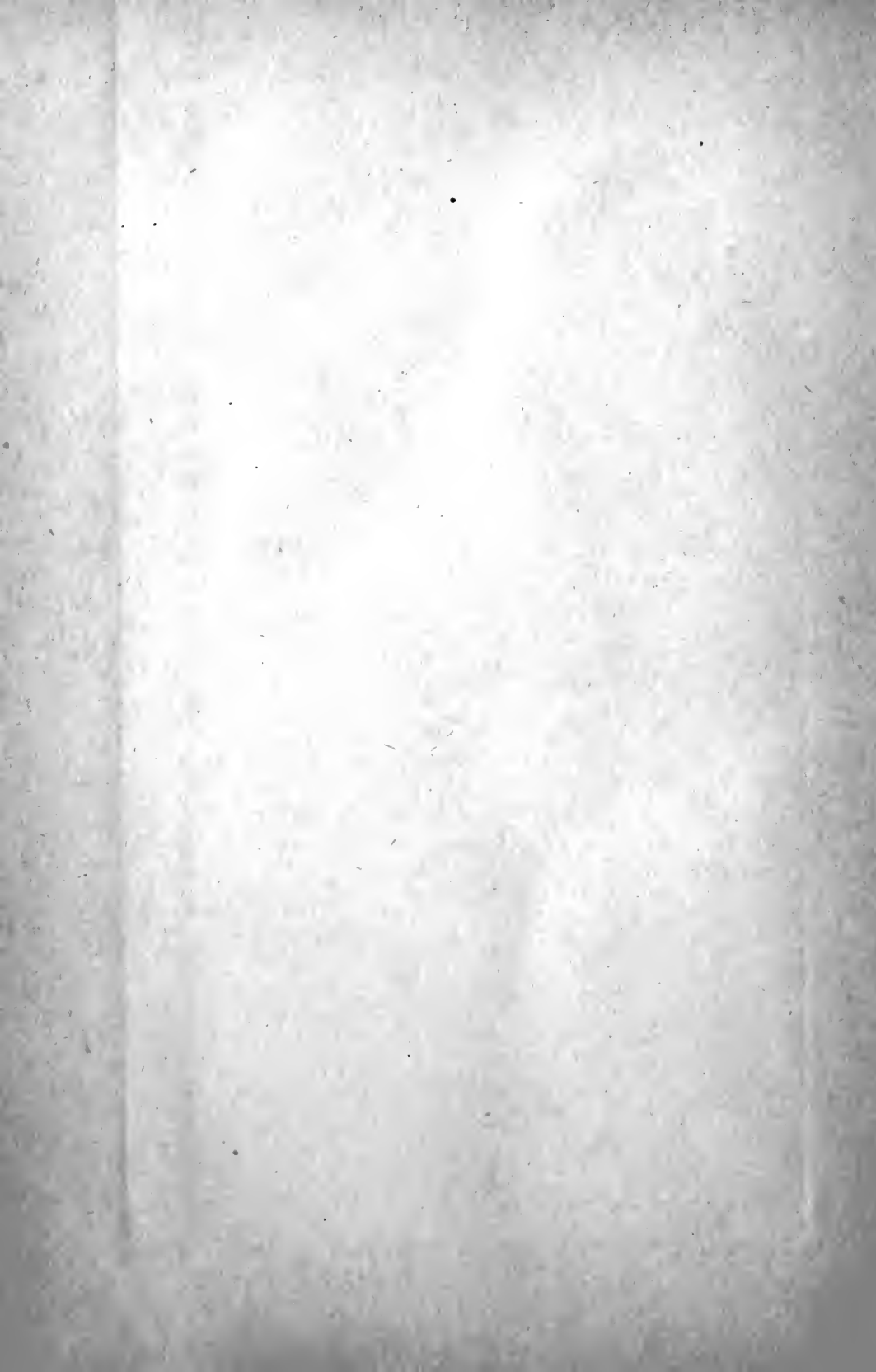
How frequently we find people that know how to care for animals, but know not how to administer to a person in distress. No doubt many know these simple things, but if only a few are taught and some good is done, the time taken up will have been well spent. There are 11,155 schools houses in this State, which have cost \$27,969,757. There are 774,660 enrolled pupils, and 1,095,469 youths of school age. With this before us, it certainly is clear, that school hygiene is a matter of the greatest importance to us as a nation.



REPORT ON THE EPIDEMIC OF DIPHTHERIA AT
WAVERLY, OHIO.

BY

AUSTIN HUTT, M.D.



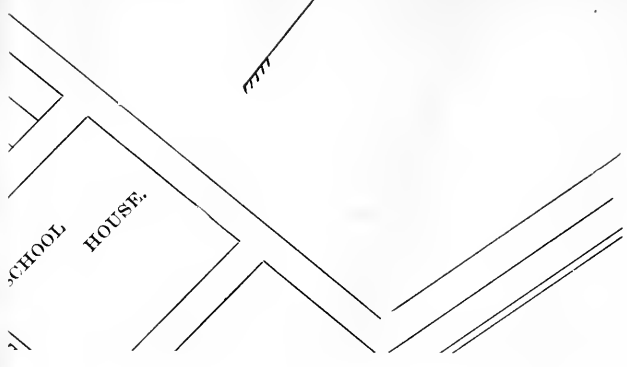
PLAT OF WAVERLY, OHIO.

- Where Diphtheria prevailed.
- † Two families residing in same house.
- Well.

No. 1, 2, 3, & 4.
Where samples of water was obtained.



SCHOOL HOUSE.



REPORT ON THE EPIDEMIC OF DIPHTHERIA AT WAVERLY, OHIO.

BY AUSTIN HUTT, M. D.

Waverly, the county seat of Pike county, is located in the Scioto Valley, seventy miles south of Columbus, and one and one-half miles west of the Scioto river; Crooked creek partly forms its southern boundary, and the Ohio canal runs through it.

The spring of 1886 was remarkable for being cold and damp, with no apparent effect on the healthfulness of the village. May 25, diphtheria appeared in the northwest quarter. The house where it prevailed is almost new, and built on made earth, located about one hundred yards from, and twenty-five feet above Crooked creek, and about fifty yards from, and fifteen feet above a log pond. This pond is supplied with water from the canal and washings of the street, and was, during the spring and summer, covered with a greenish scum and moss.

The sanitary condition of the town is everything but excellent; privy vaults, hog pens, stables, slaughter houses, garbage-piles, cattle-pens, bone dust and fertilizer depots, one and all emit their peculiar and offensive odors. This, to some extent, is difficult to overcome, so long as a few advocate the idea that one offensive odor renders another innocuous.

The soil is well adapted for excellent drainage, it being sand and gravel; the land slopes from the east and west, towards the central part, with a gentle fall to the south; thus the canal and creek act as scavengers and carry much of the street refuse away. The streets on either side, principally, have well constructed gutters, which carry the water from the streets, thereby leaving no standing water, to become stagnated. There are a few short sewers, used only for street drainage.

The water supply is from wells and cisterns. No well, in particular, has been suspected of being contaminated, and those that have used cistern water exclusively, have not been exempt from diphtheria. One case, marked for its malignancy, occurred in a family where cistern water was used exclusively.

The wells are all located in the streets, and the majority have wooden pumps with watering troughs attached. One of the wells, having an iron pump, and no trough to catch the waste water, is surrounded by one continual slop during the warm season. The surroundings of those with troughs are kept in better condition; however, this does not at all times prevent drainage of waste

water into the wells. The supply of water to these wells is from the Scioto river, and is reached at a depth of forty-five to sixty feet. Privy vaults, in a few instances, are as near as one hundred feet, while others are at a much greater distance.

In presenting the history of the epidemic of diphtheria to the public, as it prevailed in Waverly, it must be remembered that the origin and cause of the subject under consideration is confessedly obscure.

Could each individual case be taken up separately in the order of its occurrence, and the form and severity carefully noted, the laity, as well as the medical profession, would be much more benefited. In a report of this kind much more is expected than can be given; and while it may prove uninteresting to many, there will be a few, at least, who will give it more than a passing notice.

To make statistics valuable, it is necessary they should be correct. To accomplish this the writer has used all available means at his command, yet inaccuracies may occur, especially so where memory, and not notes is taken for data. In many instances the parent has been called upon for information as to whom were the child's associates before it was taken sick; and as to the duration of the illness. Occasionally the child has been able to give a correct account of himself. Chagrin often times interposes and parents are reluctant to converse of their misfortune. The physician, above all others, can impart the most valuable information; but even he can not always spare the time to make careful notes.

The following report and brief history of cases will show a state of carelessness that has existed during the epidemic, and may serve a useful purpose by way of prevention in future epidemics:

L. D., male, age five years, was taken sick May 25th, with a fever. Diphtheria was diagnosed three days afterward. There had been no visitors, neither had he been visiting. In seven days he was up and about, but very weak. In two weeks the disease returned, and he passed through the second attack. His recovery was slow.

M. D., a robust girl, ten years of age, a sister of L. D., sickened of the disease on the seventh day after it developed in her brother; death resulted on the fourth day.

The house where these children resided is a one-story frame; the front part is used for a grocery store, while the rear is occupied by the family. The well from which they obtain their supply of water is about 150 feet east; the privy vault about seventy-five feet in the rear of the house.

One-half block north of the place where the disease first prevailed, in a one-story frame and brick house combined, situated on a bank about eight feet

above the street, and occupied by families of good home comforts, is where the second outbreak occurred.

E. H., female, aged five, was taken sick June 28th or thirty-three days after the first appearance of the disease. She played with L. D. from Thursday to the following Tuesday, previous to the development of the disease; she died the fifth day.

A. H., age three years, a younger sister, played with the same children at the same time and place; she was taken sick five days after E. H., and made a good recovery. A brother, two years old, was separated from his sister, and removed to another part of town. During his absence, the house, and every thing used, bed and bedding, was thoroughly disinfected. He remained away three weeks; diphtheria developed July 28th, nine days after his return. During his absence and after his return he had played with L. D.—recovery imperfect—death occurred four weeks subsequently, from croup.

J. E., age ten, aunt of the above children, was a playmate of L. D. She played with him at the same time the others did, and the disease developed within three days after her nephew was taken sick; she made a good recovery.

The family occupying the brick part of the house endeavored to use all precautions from the start, yet, the youngest member, age six, sickened the last week of July, and recovered in five days.

About two blocks northwest of the latter family, on July 24th, B. R., six years old, was taken sick and recovered. In four days his brother, H. R., aged eight, had a sore throat, but not severe enough to be in bed. He visited every day a family residing about four blocks northwest. On August 3rd, the first case appeared in this family. H. S., five years old, was taken sick on the above date; he recovered in one week. The day following the advent of the disease here, it developed in his sister, three years old, who died in five days.

K. O., female, aged ten, had a sore throat early in June. She had been exposed to diphtheria. A white patch was observed by her mother on one tonsil; she recovered in a few days. At this time, the parents, with the children, went away for a visit. They were absent for several weeks and returned.

About the first of August, F. O., her brother, age eight years, was taken sick with diphtheria. He recovered in six days. Previous to the development of the disease in his case, H. R., on one of his frequent visits to H. S., stopped and talked with F. O. It is said they were not closer than the middle of the street, thirty feet from each other; it is possible they were much nearer. A younger brother, aged five, sickened about the time F. O. recovered. He lingered three weeks and died. On August 25th, K. O. was again taken sick with the disease and was convalescent in two weeks.

C. S., twenty-one months of age; she had not, to her parent's knowledge, been exposed to the disease; she sickened August 15th and died August 21st of croupous diphtheria. No other cases were known to be in the neighborhood at this time; however, several cases of pharyngitis with follicular secretion were known, and other cases of diphtheria developed subsequently.

G. D., fifteen years of age, was taken sick August 13th; he had not, to his knowledge, been exposed to the disease. He resided probably 200 yards south of where the first outbreak occurred; his recovery was slow. His sister, aged seven, developed the disease the next day. Another sister, eight years old, on the fourth day thereafter. They made slow recoveries. Several other cases occurred in this, the west side of the canal, but they can not be traced.

The disease appeared on the east side of the canal August 8th, in the southwest quarter. On this date, A. A., female, age fourteen, was the first to have it. She had been at home all the time, and does not think she was exposed—recovery. L. A., a brother, eleven years old, was similarly affected the next day. Convalescence was declared in seven days. A reappearance of his trouble in two weeks made his recovery slow. Another brother was sick with diphtheria September 27th—recovered.

Three blocks northwest of this family, S. H., eight years of age, developed the disease August 9th. He recovered in seven days. This boy was a playmate of L. A. They were together often prior to the disease appearing in the family, then all communication between the families ceased. It is not known whether these children had been associating with convalescents of the west side. A brother of S. H. was taken down two weeks subsequently and recovered.

E. H., aged six years, had playmates in all parts of town. Diphtheria developed August 18th, recovery perfect in seven days. His brother, age 22 months, sickened on the 24th and died September 1st.

J. F., twelve years of age, next door to E. H., was in the house with him the first day he had fever, and was about the open door often. In six days from the day he visited E. H. he was taken sick. He recovered in five days. His two sisters, aged respectively 14 and 8 years, sickened in just a week after the brother. They were down six days, and both recovered.

On August 19th, B. L., in company with her mother and brother, was passing the house where E. H. resided. He was sitting in the doorway, and she was probably as near to him as three feet. On the night of August 22d, she had a chill, and fever followed. Diphtheria developed the next day, and death supervened on the eighth day. Her mother says this was the only time she could have been exposed. Her brother, age five, was taken down on the 31st, but slowly recovered. A child belonging to another family residing in the same house, also had the disease and recovered.

On August 19th C. and F. S., aged respectively three and five years, were

playing in front of the house where diphtheria had prevailed, and two children were convalescing. C. sickened on August 22d, and was discharged well on the 30th. His brother F. complained of sore throat and had fever on September 1st, and died on the 10th of croupous diphtheria.

H. M., aged three years, a playmate of the above-named boys, sickened on the eleventh, and died on the fourth day of the malignant form. His sister, aged 14 years, was taken sick on the fifteenth of September; she was discharged well on the 26th.

L. G., female, aged 16, lived within one block of the last two families. She was taken down with diphtheria September 6th; she does not know of having been exposed to the disease; recovery. Two other members of the same family also made good recoveries.

A. J., age 17 months, visited her aunt L. G., who had a fever at the time. She nursed and kissed her. The next day the aunt complained of sore throat. Diphtheria developed on the seventh day after her visit. Her sister, age five, was taken down with the disease in nine days, and both convalesced slowly.

W. L., 22 months old, next door neighbor of the last family. Although no communication existed between the families after the appearance of diphtheria in the former, he was taken sick with a fever September 25th; two days afterward diphtheria was diagnosticated; convalescent.

On September 12th, L. S., age 8 years, was taken down. She thinks she had not been exposed to diphtheria. The disease had existed in the neighborhood five weeks previously; she made a slow recovery. Many more cases could be reported, and their histories would be similar. A case would occur in a family without any knowledge of exposure; then a few cases would occur in that vicinity which were directly traceable to the first in that locality. As a rule, children were permitted to run at large and mingle with others too soon after they were able to be out, and this may account, in many instances, for the spread of the disease.

Diphtheria, prevailing as an epidemic, is of rare occurrence in this locality. Never, in the history of the town, has it prevailed to the same extent that it has this summer and fall. Two years ago a few isolated cases, in a mild form, were observed. The cause and origin of the outbreak last spring, is at present unknown. The first two children stricken with the disease were supplied with every luxury that an indulgent parent could provide. Yet, the very ground on which the house was erected is a composition of earth, street cleanings and other trash that would have been objectionable elsewhere. Immediately across the street is a log-pond, a name given the place years ago, when it was constructed and used as a receptacle for saw-logs. It has out-lived its usefulness, and a frog-pond would be a very appropriate name of late years. During warm weather, especially in the evening and night time, the odor of stagnant water

arises, much to the discomfort of many. About the middle of summer, at the solicitation of the local board of health, the owner kept a supply of water running in and out. This has not been an effectual remedy. The well used by the families in this part of town cannot, from its location, be exempt from street drainage. Some of the privy vaults in this quarter, as in other parts of town, are in the worst condition possible; and at times an offensive odor prevades this and other parts of town, emanating from hog and cattle pens, south of the village.

There may be sufficient cause in this section to produce the disease, yet it is not established. However, one very important fact is settled; that is, the existence of a single case. The first patient was slowly convalescing; he was able to be out of doors; former playmates gathered around him; he visited among them, and the disease is developed in some of them. In the fourth family no communication or association can be traced. One boy of this family was going everywhere, and it is probable he was exposed, for he had a mild form of the disease, and evidently he communicated it to a member of the fifth, and there is no learning how many others, for he is heard of after the disease has appeared in other families. It is almost impossible to trace communication and association of persons who have recovered to all families where the disease prevailed. It has been shown in the history of cases, where children of different families have played with those that were convalescent, and in from three to ten days the disease would develop. Carelessness on the part of parents and others can not be said to be the only factor. Atmospheric causes and changeable weather is all important. A few days after a shower of rain there was a decided increase in the number of cases, both of diphtheria and pharyngitis. However since a heavy rain-fall of two and a half inches, accompanied by much thunder and lightning, on the 23d of September, the number of new cases has diminished, and the disease has apparently abated.

Total number of cases from May 24th to October 11th, seventy five; number of deaths nine, or twelve per centum. The first four cases were serious. Two deaths occurred. From July 24th until August 28th, the disease pursued a mild course, there being thirty-nine cases, with two deaths. From August 28th until September 18th, a more serious form again prevailed. During this period there occurred twenty-four cases, with five deaths. From that time to October 2d, a much milder form prevailed.

Diphtheria prevailed among all classes of people; the wealthy, the middle class, and the poor were its victims. Those who prided themselves on keeping their premises scrupulously clean and free from offensive odors, were no more fortunate than those who did not. The home comforts of the majority were all that could be desired. In a few they could have been much better.

During and after the prevalence of the first few cases of diphtheria, from June

1st to the middle of July, a fact worthy of mention, was the occurrence of simple pharyngitis. This was not confined altogether to children; it affected adults similarly. Subsequently, several of the children had diphtheria. When the disease became epidemic, a form of pharyngitis, with follicular secretion, prevailed; children and adults were alike affected. Reports show that there occurred, from August 7th to September 18th, 95 cases, and this is not all. Many cases were managed without the services of a physician.

The following meteorological tables were kindly furnished by H. W. Overman, observer of the Ohio Meteorological Bureau, at this Station :

Ohio Meteorological Bureau, Station 12 B, Waverly, Ohio. Lat. 39° 10'. Long. 82° 57'. Elevation 612 feet.

1886.	Mean relative humidity.	Mean temperature.	Highest temperature.	Lowest temperature.	Amount of rain in inches and hundredths.	Prevailing winds.	Mean relative humidity for the State.	Mean temperature for the State.	Mean rainfall for State.
	<i>per ct.</i>	<i>degrees</i>	<i>degrees</i>	<i>degrees</i>			<i>per ct.</i>	<i>degrees</i>	<i>inches</i>
March.....	82.1	59.9	76.1	10.0	3.49	S.W.	81.2	38.5	2.73
April	78.5	55.0	85.0	23.0	1.95	S.W.	72.4	51.6	2.57
May	80.4	63.6	87.2	38.2	5.08	W.	77.4	62.2	4.23
June	85.8	67.8	89.1	43.8	6.61	S.W.	75.7	67.5	3.53
July.	78.7	72.9	91.5	54.0	4.76	W.	73.1	72.0	2.88
August	82.4	72.7	90.0	46.0	2.69	N.E.	78.0	70.9	3.62

Average humidity, six months, 81.3.

Mean temperature for six months, 61° 9.

Amount of rain for six months, 24.58.

Average humidity for the State for six months, 76.3.

Mean temperature for the State for six months, 60° 4

Mean rainfall for the State, 19.56.

From the above table it will be seen that the mean relative humidity for this station is above the average for the State, as 81.3 per cent. to 76.3 per cent.

The amount of precipitation is also largely in excess of the average for the State, to wit : 5.02 inches.

The temperature may be considered about normal as compared with other stations of the same latitude.

The mean relative humidity (average) for the State has been as follows :

Month.	1883.	1884.	1885.	1886.	Summary for four years for State.	Excess at this station for 1886 over 4-year period.
March.....	75.5	79.3	77.9	81.2	78.5	3.6
April.....	71.5	76.2	74.1	72.4	73.5	5.0
May.....	70.4	72.7	71.7	77.4	73.1	7.3
June.....	70.4	72.7	71.7	75.7	75.1	10.7
July.....	74.8	70.1	74.1	73.1	73.0	5.7
August.....	74.8	70.1	74.1	78.0	75.4	7.0

The analyses of four samples of water examined by Prof. C. C. Howard, of Columbus Ohio, are given in the following report :

Parts in 100,000.

No.	O. required.	Free NH ³	Alb. NH ³	Nitros Acid.	Chlorine.	Total Solids.
1.	.50	.013	.018	Trace.	.57	23.8
2.	.16	.002	.007	.0025	3.48	74.2
3.	.16	.008	.007	.0028	2.56	63.4
4.	.26	.020	.008	.0005	.42	9.0

No. 1. Too high in free and albuminoid ammonia and in organic matter as indicated by "oxygen required" to be a good water. The small amount of chlorine would indicate absence of contamination from vaults. The water should certainly not be used.

Nos. 2 and 3. With the exception of the free ammonia in No. 3, which is high, these two waters if found in a city would have to pass not as pure, but as fair waters. The nitrous acid in both samples is indeed high; the waters make a very fair showing.

No. 4. Too high in "oxygen required" and in free ammonia for a well water, but if a cistern water, the presence of these and the small amounts of chlorine and solids are readily explained, as a cistern water could not be condensed and the result would show that there is no contamination from vaults. The importance of knowing something of a source of a water is well shown in this sample. If supposed to be a well water the result would appear absurd and contradictory. When known to be a cistern water the result becomes intelligible.

No. 1. This sample of water was obtained from a "log-pond." This pond is located near the southern terminus of North street, between it and the Ohio canal, and is separated from Crooked creek by an embankment. This pond is about two hundred feet long by about one hundred wide, and from three to five feet deep. It was constructed many years ago as a receptacle for saw-logs, and is yet, to some extent, used for that purpose. It receives its supply of water from the canal. During the spring and early summer, there being no ingress or egress to this pond, the water undoubtedly becomes stagnated, as indicated by a peculiar odor arising therefrom, and the luxuriant growth of moss therein.

At the present time the water is very clear, and the moss can be seen in many places lying at the bottom, a decaying mass.

By reason of its location—it being several feet below the street and adjacent lots—it is a depot for the greater part of the street washings in that locality; this water is not used.

No. 2. This sample was obtained from a well located on North street, about one hundred feet north of the pond, and is known as the saw mill well. It is about sixty feet deep, and walled with brick. The old-fashioned wooden pump is used to draw the water. The top of the well is covered with sawed stone and boards; it is elevated about eight inches above the side-walk. A watering trough is attached, but this does not at all times prevent a drainage of waste water into the well. Since the street is higher above than at the well, it is probable that it is not altogether free from street drainage.

There are several privy vaults in this quarter of the town, but none are nearer than one hundred and fifty feet. The depth of vaults ranges from six to ten feet. The soil is a dark loam, with a brownish, sandy clay sub-soil; gravel and sand are reached at a depth of two to four feet, consequently the bottoms of these vaults are either a bed of gravel or sand. What applies in this part of town to the earth and privy vaults, is equally true of all parts of town.

No. 3. This sample of water was taken from a well located on Second street, in front of the court house. It is about fifty feet deep and walled with brick; its top is neatly covered with sawed stone; an iron pump is in use. There being no watering trough, the surroundings are very sloppy, especially during the warm season. The water from this is used by more people than any other well in the village. It is located on the outer edge of the side-walk; many children resort to this pump, and all drink from the same tin cup. Much of the waste water finds its way back into the well, and it is possible it is not free from street drainage. Privy vaults in this quarter are numerous, but none are nearer than one hundred feet.

The wells in all parts of the village receive their supply of water from the same source, the Scioto river. It flows through gravel and sand, and can be found any place at the depths stated above.

No. 4. This sample was taken from a cistern, at a dwelling house. This cistern is filled with rain water from two different houses; one has a shingle the other a tin roof. The water is conducted to the cistern through a tin spout. It is neatly covered, and the surroundings good.

In this village the water for drinking and household purposes is obtained from two sources, viz: wells and cisterns. The majority of these wells are located in the streets, a few on individual premises; these are also accessible to the public. Cisterns are private property and many persons fill them in winter time with rain and snow water for use the following summer.

From the nature of the soil and the underlying beds of gravel and sand, and from the fact that all privy vaults are made by excavating, together with the close proximity of said vaults, to the wells, renders it possible for the water in the wells to be contaminated; but inasmuch as gravel and sand, and even the soil, are great depurators, it is possible they are not. But when time is considered, and it is by no means an unimportant factor, changes will have taken place in the earthy matter which may render its depurating powers inert. For instance, it is not uncommon to find a vault of twenty years still in use, and many more of greater age buried from sight and forgotten. The liquid contents of these vaults, spread through the gravel and sand, and the older the vault the further it has extended; undoubtedly it increases in area each year, and thus it spreads year after year. The earth nearest the vault loses more and more its depurating power, until a wide range is saturated, consequently the liquid contents maintain their strength for a greater distance after they leave the vault than they did when the vault was new, and they are carried further into the gravel and sand before they are relieved of their noxious burden.

The soil being of a sandy nature readily takes in, to a point of saturation, all the rain that falls, and as the water sinks lower and lower into the earth it carries with it the privy contents; and thus it is borne along, seeking a wider range, until it finds its way into the nearest well, from whence it is drawn in the sparkling water that quenches the thirst of the playful child or robust adult; and while their thirst has been quenched they little realize the danger in that drink of water.

REPORT ON POLLUTION OF WATER COURSES BY
STRAW-BOARD FACTORIES.

BY

H. J. SHARP M.D.,

Chairman of Committee on Water Sources, Sewerage, Drainage, etc.

REPORT ON THE POLLUTION OF WATER-COURSES BY STRAW- BOARD FACTORIES.

BY H. J. SHARP, M. D.

Complaints have been filed with this Board, calling attention to the pollution of certain rivers and streams in the State from the refuse and washings being drained into them from various straw-board factories, situated upon or near said streams. From the information gathered in prosecuting the investigations into these complaints, it has become apparent that one of the most important subjects that will engage the attention of this Board, at an early day, will be this one relating to the pollution of our streams from this source, inasmuch as it involves an important industry, employing a large amount of capital and furnishing employment to a large number of laborers. And on the other hand, as specified in these complaints, the value of land situated along these streams is depreciated by reason of their pollution rendering their waters unfit for the live stock to drink and for mechanical purposes, and from the belief that it is a cause of sickness to those families living near them, and of death to the fish.

We believe that it should be the policy of this Board to avoid, as far as possible, any interference with business interests, or disturbance of the relations of labor and capital in economic industries, but, as contemplated in the act creating it, we are constituted the legal conservators of the health and lives of the citizens of our commonwealth, in so far as we can prevent or correct any evils of sanitation that may threaten or cause sickness and disease. In carrying out these provisions of the law, our Board cannot be a respecter of persons. When dealing with those evils that affect the public health, we are expected to be as stern as justice and as uncompromising as truth, whether these pertain to individual or the combined interests of moneyed corporations. By a clause of section two of the law creating this Board, it is contemplated that it shall be one of its duties to look after those conditions that affect live stock or domestic animals, and if it is made apparent that the pollution of these streams from the source complained of, render them unfit for stock water, then it becomes our duty to interfere in behalf of the live stock interests, and the protection of those farmers whose lands are located along these streams.

THE POLLUTION OF SCIOTO RIVER.

Below is given the report of Dr. W. H. Cretcher, President of this Board, upon the pollution of the Scioto river, for a distance of some miles in the

vicinity and above and below the town of La Rue, Marion county. Dr. Cretcher visited the scenes of complaints in this case, and after a careful investigation of the causes and conditions affecting the water of this stream, and its effects upon the fish, live stock and upon persons residing along it, has submitted a very full report which I take pleasure in giving in full, together with letters and affidavits bearing upon this case, and the analyses of specimens of the water made by Prof. C. C. Howard, Columbus, Ohio.

C. O. Probst, M.D., Secretary State Board of Health—DEAR DOCTOR: On the evening of August 10, 1886, I received a telegram, signed by the Hon. John J. Hopkins, of La Rue, Marion county, requesting me to come on the next train, and examine into the condition of the Scioto river, "the pollution of which is killing the fish and endangering health."

I answered by telegraph that "complaint should be made to the Fish and Game Commission," and also added that I would write to him next day. Next morning, before I had written, I received the following letter from Mr. Hopkins:

LA RUE, OHIO, August 12, 1886.

Dr. W. H. Cretcher, Bellefontaine, Ohio—DEAR SIR: Your telegram in reply to mine at hand. We hope you may be able to come up and see the situation for yourself, but thought it advisable to write you, explaining the situation. For three years now, whenever the water in the river is low, some substance has been allowed to escape into the river in the vicinity of Kenton, in great quantities, that turns the water black, kills the fish (especially the larger ones in the bottoms of the pools), pollutes the water so that stock cannot drink it, or engines use it; and fills the air adjacent with an offensive smell. It is undoubtedly the duty of the Fish Commissioners to look after the protection of fish; but the effect of those that are already dead and decaying along the banks, upon the health of the people, and the injury to stock from drinking this impure water, it seems to us, come within your jurisdiction. The drouth is so great that the people have to rely largely on the river, especially for use in threshing engines, but they cannot use the water as it is now. The C., C., C. & I. Railway Co. have given orders not to take water at this place, and are put to great inconvenience in consequence. Several of the farmers report stock sick from drinking the water, and even if it were not unhealthy, it is certainly very offensive. The people say that it is caused by the straw-board paper mill at Kenton; and that is probably the cause. The mill company have been personally appealed to, but they claim to be violating no law, and refuse to change their practice. The effect is an outrage upon the people, and if there is no law affecting the case, we wish to know it, and appeal to the law-making power for relief. But I think your Board has jurisdiction over results, at least, if not over causes, and we hope that you will come up on next train and join us in a carriage drive to Kenton (fourteen miles), and see for yourself.

Will also write to Judge Ingalls.

Respectfully,

JOHN J. HOPKINS.

August the 13, I visited Mr. H. P. Ingalls, who is a member of the Fish and Game Commission, and showed him Mr. Hopkins' letter. We then arranged to go together,

and the next day, August 14, we went to La Rue; we were met at the depot by Mr. Hopkins and a number of other citizens.

The Scioto runs within a few yards of the depot at La Rue, and we were not long delayed before beginning the business of our visit.

Our first place of observation was from the bridge of the C., C., C. & I. R'y, the water appeared dark, almost black in color, the surface was clear of scum or floating substances; when dipped up into a glass the water had the appearance of weak coffee. We could discover no particular smell arising from it; there certainly was no stench. I filled a half gallon bottle at the bridge for analytical purposes.

We then made inquiry about the dead fish that had been reported, and was told that the village marshal had buried them. We proceeded to find him, and asking him to be particular as to the amount of fish he buried. He answered that he gathered them up into a tobacco pail, and that there were nineteen pailsful. We saw no fish, either dead or alive, and were informed they were all dead and buried.

Our next inquiry was concerning the health of the citizens of La Rue, and those living in the vicinity of the river. We met Dr. Wm. Shira and he said that the health of the community was good, very little sickness of any kind, and none that he thought could be attributed to the river. A dozen or more citizens were asked the same question, as we met them indiscriminately, and they all return about the same answer, "very healthy for this time of year, don't know of but very little sickness."

Next we inquired why it was the water of the Scioto could not be used in engines, and was informed that upon boiling it became very frothy, which rendered the steam-gauge uncertain in marking the amount of water in the boiler.

We then proceeded up the river to Kenton, crossed and recrossed it several times, and examined it at various points. The general appearance of the river was the same as it was at La Rue; very little running water, but here and there long, dark pools. No particular smell, and saw no dead fish.

We also interviewed several citizens, on our way, relative to the effects of the polluted river; they all, without exception, reported the health good in their neighborhoods. The testimony of Mr. Wheeler, a well to do farmer living on the Scioto, about four miles below Kenton, is a fair sample of the testimony, in general, that we obtained. He said he did not like to have the river discolored in the way it was at present; he was sure the pollution killed the fish. He said that his stock did drink the water, and whilst none of them were sick, he would much prefer the unpolluted water for them. He also stated that the water could not be used in the threshing engines, and because of the scarcity of water in the wells it produced great inconvenience at this season of the year. He did not know of any sickness that could be alleged to the condition of the river.

From there we drove into Kenton, observing the river at two points on our way, but found nothing different from what we have already described. At Kenton we found Mr. Ashton Letson, a personal acquaintance of mine, and is the treasurer and a large shareholder of the Straw-board Manufacturing Company. Upon the information of our business, he at once invited us to visit the factory, and politely showed us through and explained every thing concerned in the manufacturing of straw board; a minute description of which is here unnecessary; suffice it to say that the only chemical they use is lime. They use a carload of lime every week; all the straw used is first mascerated or steamed for twenty-four hours in a strong solution of lime. After it is

reduced to a pulp the lime is washed out, using a large amount of pure water, the washings largely impregnated with lime runs off in quite a large stream and empties into the river a short distance below the factory. I made observations of the river, and obtained half gallon samples of the water, both above and below the factory.

The river, in size, at Kenton, is hardly that of a respectable creek, and is but very little larger at La Rue. The current is necessarily very slow and sluggish, because the water does not average one foot fall per mile for thirty miles. Above the factory the water stood in filthy pools, very offensive to look at, and not pleasant to the smeli. Mr. Letson told us the water was so filthy above the factory that they could not use it for washing the pulp as originally designed, and they were compelled to dig a well 400 feet deep to procure sufficient pure water for that purpose. Mr. Letson admitted that the large amount of lime used killed the fish, and that many dead fish were unpleasant, and if left unburied would create sickness; but he claimed that the filthy water at this low stage of the Scioto was benefitted by the lime from the factory. A large sewer, draining the larger part of Kenton, empties into the Scioto just opposite and above the factory. Mr. Letson claims the pollution from this sewer would be much more objectionable if it did not soon meet the lime water from the factory a few yards below. At a full stage of the river, or for several months in the year, the effects of the lime water are not visible, it is only when the river is very low and there is not water to sufficiently dilute the lime, that the people complain.

The company expressed a desire to make different arrangements for the disposal of the washings if possible. They admit that the washings kill the fish, but deny that they pollute the river in a sense to endanger health. They think that a large amount of valuable fertilizing material is going to waste by running it into the river, and are now trying to devise some means by which they can save it.

I obtained half gallon samples of water from four different points and sent them by express the same day to Prof. Curtis C. Howard, of Starling Medical College, to be analyzed. As yet he has made no report.

Before leaving Mr. Hopkins and Mr. Marsh, (the gentlemen who accompanied us to Kenton,) we requested them to procure written affidavits from a number of "old residents and influential citizens," in regard to the pollution of the Scioto. They promised to do so, and said they would send them to me as soon as they could conveniently do so. Up to the present time they have failed to fulfill their promise.

Yours respectfully, etc.,

W. H. CRETCHER.

BELLEFONTAINE, O., August 20, 1886.

Below is given the report of Prof. C. C. Howard upon analysis of the samples of water sent him by Dr. Cretcher, also copies of affidavits of persons living near the river, bearing upon the subject :

State of Ohio, Hardin County. ss :

Before me, a notary public, in and for said county, personally came E. E. Smith, who being duly sworn said he is a resident of Dudley township, in said Hardin township, and owns land abutting on the Scioto river. That about two months prior to this date he began to observe the water in said Scioto river to grow black and to smell offensive as the volume decreased. That on or about the 5th, 6th and 7th of

August, 1886, the fish therein began to die because of the pollution of said river and be deposited in great numbers on the banks and riffles; that the stench arising from such decaying fish was almost unendurable; that the affiant has witnessed the same condition of things twice before at low water. That affiant runs a thrasher engine, and because of such pollution is prevented from using said water, to his great cost and detriment; that said water can not be used for stock or any other purpose; that affiant believes such pollution to be caused by refuse from the straw-board paper mill at Kenton, Ohio, which is allowed to run into said river, and that such pollution of the water and destruction of the fish has become a nuisance, for the abolishment of which affiant will ever pray.

E. E. SMITH.

Sworn to before me, and subscribed in my presence, this 4th day of September, A. D., 1886.

FRED WAYMACK, *Notary Public.*

State of Ohio, Marion County, ss.:

Before me, a notary public, in and for said county, personally came G. C. Allinger, John C. Bechtold, E. Anderson, Patt. O'Brien, H. Durkin, P. W. Thomas, T. P. Dodd, E. W. Stivers, J. H. Carter, N. T. Prettyman, James Crowley and Frank Foster, who, being duly sworn, each for himself, depose and says that he resides near the line of the Scioto river, in the village of La Rue, Ohio; that for two months past, the water in said river has been so polluted by substances thrown in above; that the smell arising therefrom was and is so offensive that affiants are compelled to keep their windows closed, to their great discomfort; that during the first and last weeks of August, 1886, the fish in said Scioto river died, in great numbers, because of said polluted water, as affiants believe; and the stench arising from such decaying fish rendered the neighborhood almost uninhabitable, until said fish were collected and buried by the village officers; that, prior to such pollution, the water in said river was not offensive, nor dangerous to animal life; that affiants are damaged in this, that their several properties are reduced in value because of nearness of such impure river; that such pollution of the water in said Scioto river is caused by permitting refuse from the Straw-Board Paper Mill, at Kenton, Ohio, to run into said river, as affiants believe; that the pollution of said river, as herein complained of, is dangerous to the health and comfort of the people living near its course; and has become and continues to be a nuisance, for the abatement of which these affiants will ever pray.

JOHN C. BECHTOLD,
E. ANDERSON,
PATT. O'BRIEN,
H. DURKIN,
P. W. THOMAS,
G. C. ALLINGER,

T. P. DODD,
ED. W. STIVERS,
J. H. CARTER,
N. T. PRETTYMAN,
JAMES CROWLEY,
FRANK FOSTER.

Sworn to before me, and subscribed in my presence, this 7th day of September, A. D. 1886.

W. CAMPBELL, *Notary Public.*

COLUMBUS, Sept. 10, 1886.

Dr. C. O. Probst, Secretary Ohio State Board of Health—DEAR SIR: Following are re-

sults of examination of sample of water from Scioto river, polluted by refuse from paper mill in Harding county :

- No. 1. Scioto river above mill.
 No. 2. " below mill.
 No. 3. " at La Rue.

Grains per gallon.

No.	Lime (Cal.)	Chlorine (Cl.)	Mineral.	Organic and volatile.	Total solids.
1.	8.98	.25	20.30	9.68	29.98
2.	63.32	6.49	84.09	130.63	214.72
3.	13.35	1.45	31.26	18.19	49.45

Respectfully submitted.

CURTIS C. HOWARD.

Reference to the results of Prof. Howard's analysis shows that lime, chlorine and mineral, and organic matter is found in much larger per cent. below than above the mill, and that these must cause the pollution of water, with the results that follow, viz.: discoloration of the water, destruction of fish, offensive odor, and whatever effect it may have in causing sickness.

The lime is eight times greater in quantity below than above the factory ; chlorine about twenty-five times as great, and the mineral, organic and volatile matters are largely increased. These substances doubtless account for the results complained of.

The Secretary of the Board was instructed to write to the prosecuting attorney of Hardin county, directing him to bring action against the offending parties under sections 6921 and 6923 of the Revised Statutes, which provide against the pollution of water-courses.

After conferring with the owners of the mill at Kenton, Ohio, the prosecuting attorney, Mr. Chas. M. Melhorn, wrote to the Secretary as follows :

KENTON, OHIO, Sept. 14, 1886.

C. O. Probst, Secretary Ohio State Board of Health, Columbus Ohio—DEAR SIR: I am in receipt of your letter of the 11th inst., directing me to commence proceedings against the paper mill company of this place for polluting the Scioto river in this vicinity with the refuse of the paper mill. Before commencing action I have thought it best to write you that a proposal is now made by the owners of the mill to the complainants along the river to construct a settling pit of four or five acres to receive the polluting matter, instead of permitting it to empty into the river and causing the nuisance complained of. In consequence of the construction of some dams for successful ditching above this place, the river has been exceptionally low this summer, which has, perhaps, aggravated the matter. What I wish to know is, shall I commence immediate action or wait a sufficient time for the company to comply with the proposal they have made to the complaining parties? If immediate action is desired, please forward the affidavits you mention in your letter.

Very respectfully,

CHARLES N. MELHORN,
Prosecuting Atty., Hardin County, Ohio.

Upon the receipt of the following letter from Mr. A. Letson, President of the Scioto Straw-Board Company, the Secretary was instructed to write to the prosecuting attorney and Mr. Letson that legal proceedings would be stayed for the present, in order to give the company time to complete the construction of a settling pool and to test its efficiency in obviating the pollution of the river.

Doctor Cretcher—DEAR SIR: We have secured the ground to make our settling pool on, and it will be from three to five acres. Think it will fill the bill; and as it is late in the season, and we never have any complaint only in warm and dry weather, and therefore we will commence our levy as soon in the spring as the weather will permit. I have met several of the parties along the river and they seem satisfied with the plan. Hoping this will be satisfactory,

I remain yours truly.

A. LETSON,
Pres. Scioto Straw-Board Co.

THE POLLUTION OF DARBY CREEK.

Upon receipt of the following letters, I visited the scenes of complaints on September 17, 1886, for the purpose of investigating the alleged causes of complaint and to subserve a duty as a member of the board:

Extract from letter from Dr. F. N. Mattoon:

PLAIN CITY, OHIO, September 10, 1886.

Dr. H. J. Sharp—DEAR SIR: * * * * The washings from the paper mill in our town are conducted into Darby creek, and so pollute the water that vegetation that grows in the edges of the stream, and the fish, for two or three miles below the mill, cannot live; hence if you were here now you would observe the water in the creek as black as ink and offensive in odor, dying the vegetation and killing the fish for miles down the stream. * * * In the family of Mr. James Boyd, living one mile south of town, I have been and am treating four cases of typho-malarial or continued fever, viz., Mr. Boyd, daughter and two sons. * * * * At Mr. Huff's, the next family below Mr. Boyd's, I understand there have been three cases of similar fever, and there are several other cases in the neighborhood. In my opinion, the miasm from the creek is the cause of so many cases in the two families, for their houses are favorably situated to receive it, being only a few yards distant from the creek. * *

Respectfully yours,

F. N. MATTOON.

Letters from Mrs. Ann E. Boyd and Mr. L. Y. Huff, Plain City, Ohio:

PLAIN CITY, OHIO, September 14, 1886.

Dr. H. J. Sharp, London, Ohio—DEAR DOCTOR: Having learned recently that you are a member of the State Board of Health, I feel it my duty to enter a complaint against the paper mill located at Plain City. The drainage from said mill has polluted the water in the creek, killed the fish and vegetation in the creek, and is causing malaria. We have been sorely afflicted; our house has been a hospital. Mr. Boyd is very low with typho-malarial fever; has been sick over forty days. Our children,

who have been sick are improving. The doctor says it is the condition of the water in the creek that causes our sickness. Our neighbors are sick. I send this message praying that something be done to relieve us. We will be obliged to leave our home if this continues.

This is a second attack. That of one year ago was not so severe. To be convinced of the fact, come and see.

Respectfully yours,

ANN E. BOYD.
Wife of James Boyd.

P. S.—Wish to say that we have lived here on the farm for twenty years without any sickness whatever.

A. E. B.

PLAIN CITY, OHIO, Sept. 15, 1886.

Dr. H. J. Sharp, Member State Board of Health—DEAR SIR: I write to you concerning a matter of great importance to me, that is, the health of my family. I reside about one and a half miles south of Plain City, Madison county, on the west bank of Big Darby creek. At Plain City there is a paper mill which empties its waste-pipes into this stream and so pollutes it as to kill the fish and poison the atmosphere to such an extent as to cause serious malarial troubles. My family have nearly all been down with it, and our neighbor, Mr. James Boyd, has a family of five, four of whom have been very sick. Mr. Boyd, himself, at this writing, is lying very low of typho-malarial fever. Dead fish are to be seen all along the creek; the water is black, and the odor arising from it during the evenings is almost unbearable. Our live-stock have to drink this bad water, (as our creek lands are almost invariably in pasture,) and we fear bad results from this source, also. Now, we do hope you will take an interest in this matter, and, therefore, we pray you to see that a committee be appointed, as soon as possible, to investigate it. We certainly are entitled to protection from some source, and we appeal to you hoping that you will give this your earliest attention.

I am very truly your obedient servant,

L. Y. HUFF.

The mill referred to is situated in Plain City, near Darby creek, from which it pumps a large amount of water used in washing and preparing the straw-pulp. Large quantities of lime are used in macerating this straw, which is then passed through large revolving vats filled with water, the lime being thoroughly washed out, and this water, saturated with lime, and containing a large amount of organic matter, washed out of the pulp, and a small amount of log-wood and sulphate of iron, which is used in the process, is carried through a sewer-pipe and emptied into Darby creek, at a distance of about forty rods from the mill.

The amount of waste water thus constantly drained into the stream is enough to nearly flush a four inch sewer-pipe.

As this water flows from the pipe it is of a dirty straw color, and has little odor and can not be very objectionable to the taste, as cattle drink it where it

escapes and before it reaches the creek. After it reaches and mixes with the water in the stream, the whole becomes darker in color, and, at times, offensive in odor, and proves destructive to the fish. At the time of my visit the water in the creek was at a low stage, and was very dark colored, and in places might be seen numbers of dead fish. I could not, however, distinguish any odor, which, perhaps, might have been due to the time of day and heat of the sun's rays. I would expect any odor to be much more perceptible in the evening or at night, and such, upon the testimony of persons living near the stream, is the case, the odor becoming, according to some, almost intolerable at times in the evening.

I visited the families of Messrs. Boyd and Huff, and found the conditions corresponding to those enumerated in the letter above. Mr. James Boyd was very sick and died the day succeeding my visit. His residence was situated on a beautiful elevation overlooking the creek, and everything surrounding it seemed well kept, and would not lead one to suppose that the sickness of the family was due to any local causes affecting the premises. At a point opposite the house the creek makes a bend, and the breezes sweeping over the creek for some distance would carry its vapors toward the house, thus favoring any deleterious conditions that might arise from this source. Mr. Huff's residence is situated near the stream, and the location would favor the same condition affecting that of Mr. Boyd, and I have no doubt but that the sickness in these families was caused by miasmatic poisons, emanating from the creek. I found that the color, during the low stage of the river, affected the water for four or five miles below the mill, and that the fish were killed, and the water seemed very objectionable for the use of live stock.

In the following letter addressed to the president of the company operating this mill, I called attention to the conditions complained of, and to the statute referring to the case :

LONDON, OHIO, September 28, 1886.

Mr. Dudley, President, Plain City Paper Mill Co., Plain City, Ohio—DEAR SIR: Complaints having been filed with the State Board of Health, charging that the washings and refuse from the Plain City Paper Mill, are a cause of pollution of the Big Darby creek, rendering the water unfit for live stock to drink, killing the fish in the stream, and causing sickness of persons living near it.

To learn the facts in the premises, I visited the scenes of complaint on Friday, the 17th inst., and am convinced that some of the charges are well-founded—there being no doubt but that pollution of said creek exists, and that said pollution is caused by said paper mill, and I adopt this medium of asking your attention to this matter, and beg that you, at your earliest convenience, will inform me as to what action the company of which you are a representative and president, may have to propose to remedy the evils complained of.

I would respectfully refer you to sections 2921 and 2923 of the Revised Statutes pro-

viding against pollution of water courses, and would add, that we will be compelled to instruct the prosecuting attorney to bring action under the sections of the statutes referred to, if some steps are not soon taken to avoid and remedy the evils referred to. Hoping for a reply at an early date,

I am, most respectfully, yours,

H. J. SHARP, M. D.,
Member State Board of Health.

No reply having been received, the prosecuting attorney of Madison county, was instructed to bring the matter before the grand jury in proper manner, and the names of parties having knowledge of the evils complained of, were given him to be summoned before this body at its session in November.

At this session of the grand jury a few of the witnesses subpoenaed appeared, but others whose testimony was considered more important did not appear, and so far as I could learn no effort was made to compel their attendance. I have been informed that the grand jury did not deem the evidence of sufficient weight to find an indictment, and thus the case rests.

That there was pollution of the stream seemed clear enough; but to get those parties who were loudest in their complaints to appear and testify before the grand jury was the difficulty encountered, and this same difficulty is encountered in other similar cases of complaint, so that it is doubtful if we will be able to reach these cases, and remedy the evils complained of, except by persistently fighting in the cause of right and the people and, perhaps, without any grateful recognition on the part of those whom we attempt to benefit.

POLLUTION OF THE TUSCARAWAS RIVER AND THE OHIO CANAL.

Dr. T. C. Miller, a member of this Board, and in whose district of counties the scenes of complaint are situated, has filed with the Secretary a number of letters received from different parties living at Canal Fulton, Stark county, complaining of the pollution of the Ohio canal and Tuscarawas river from the refuse and washing drained into these waters from a straw-board factory located near New Portage, Summit county. These letters stated that the waters are discolored and emit a stench that is very offensive, and the fish are killed, and that some claim that live-stock is made sick and even killed from drinking the water.

Dr. Miller was instructed to inquire into the conditions, and if he deemed there was just cause of complaint, to instruct the prosecuting attorneys of those counties wherein the complaint was made, to commence action against the

offending parties. The Doctor after investigating the subject, owing to apathy on the part of those most intimately concerned, advised against any legal proceedings at that time, and thus the matter has been allowed to rest.

POLLUTION OF THE SANDUSKY RIVER.

Complaints by letters were filed with this Board, charging that the refuse from a straw-board mill near Tiffin, Seneca county, Ohio, was causing discoloration of the water in the Sandusky river, causing death to the fish and rendering said water unfit for live stock to drink, and perhaps, causing sickness of persons living near the stream. In this case the prosecuting attorney of Seneca county, was instructed to make inquiry as to the verity of these complaints, and, if after such inquiry, the state of things should be found to exist as represented in these letters, he should take proper steps to bring the offending parties to answer before the grand jury. In reply the prosecuting attorney wrote that the owners of the mill referred to, claimed to have desisted from polluting the river, and disclaimed having caused any pollution in the past.

In reply to this letter from the prosecuting attorney, I wrote asking him to advise with the health officer of Tiffin, Ohio, and if after investigating, the same conditions were still found existing as gave rise to complaints that had been filed with the Board, there remained but one course to pursue, viz.: to bring the offending parties to answer before the grand jury, under sections 2123 and 2129 of the Revised Statutes, for causing pollution of the river in question.

Nothing further was heard from this case, and, doubtless, the matter was dropped, from the disposition to cover up great sins against individuals, and even communities, when the party committing them is a moneyed power with reciprocal relations affecting common business interests of the people. There is no question whatever as to pollution of the streams referred to in the report, and of the effects of this pollution, as described in the letters and affidavits filed with this Board, in causing the destruction of fish in these streams and rendering the water unfit for mechanical purposes and for live stock, and, perhaps, affecting the health of those residing near them, but I infer from what has been observed thus far, that it will be a somewhat difficult undertaking to remedy these evils by legal process. If the matter could be brought to the attention of the grand juries in these different counties while the evils are most apparent and the complaints loudest, bills might be found against the offenders, but as in the case of Darby creek, after the rains had flushed the stream and caused an abatement of the evils before the session of the grand jury, more

weight was attached to testimony describing the present than to that of past conditions, hence the failure to find against the offending parties.

I would suggest, if this subject is to engage the attention of the Board in the future, that proper means be adopted for the purpose of collecting evidence as soon as conditions giving rise to complaints show themselves, and that a member or members of the Board make a careful investigation, by personal inspection, and superintend the collection of testimony, and to see that the prosecuting attorneys or other officials whose duty it is to enforce the statutes, give proper attention to these cases.

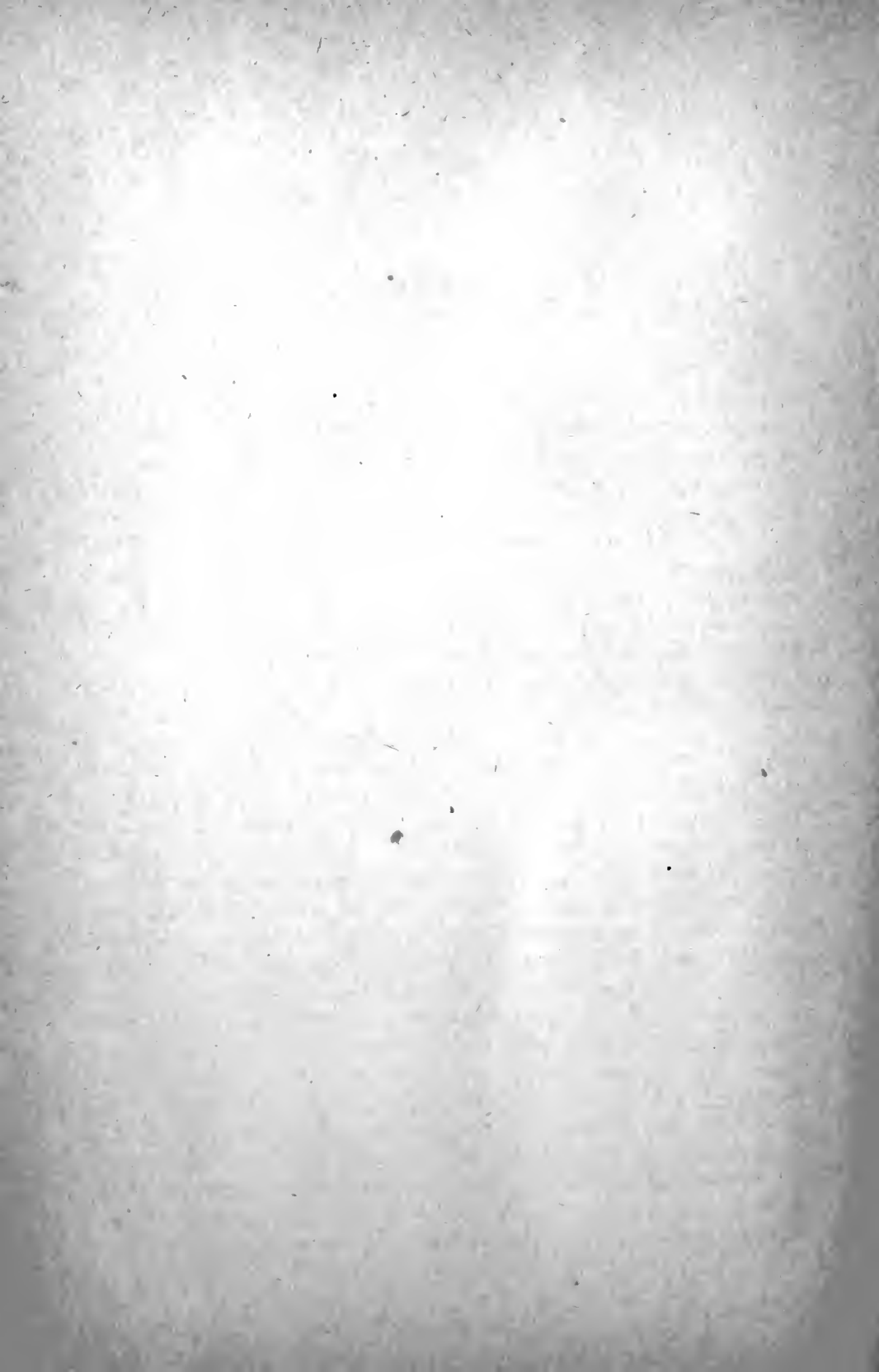
I think that good will result from what has been done in these cases, and that by giving notice to the owners of these factories, early the next season, they will adopt some plan of preventing the evil, but if they continue to cause pollution of these streams, in the same manner as in the past, they will be prosecuted to the full extent of the law.

SANITARY HISTORY OF CLEVELAND.

BY

G. C. ASHMUN, M.D.,

Health Officer.



SANITARY HISTORY OF CLEVELAND.

BY G. C. ASHMUN, M.D.

While most of the cities situated on or near the chain of "Great Lakes" have many physical characteristics in common, yet with time and development each presents some peculiarities. It is true of most or all of them that their origin began in connection with the water advantages afforded, either by the lake or streams which find the lake at these points. And as a cause for their original location, so the growth of these cities has been directed, and in certain lines controlled largely by the waterways on which they early depended. Now that they are grown to include many other interests and resources, with populations of from one to seven hundred thousand each, owing to their original physical characters and the similarity in pursuits of their citizens, they present many sanitary questions, the answers to which will apply to all.

The territory now embraced in the city of Cleveland comprises about thirty square miles or twenty thousand acres. This tract lies mainly inclining toward the north and Lake Erie, above which it rises from sixty to two hundred and fifty feet. About two-thirds of the surface has a sandy soil, some of which is clear lake sand, resting upon clay or shale at the depth of from five to twenty feet. The other third of the surface is a moderately firm clay. This tract of land is traversed from south to north by the Cuyahoga river, a small stream about eighty-five miles in length, capable of being and now is used for docks and large vessels for about three miles from its mouth. The city is thus divided, with about three-fourths of its population and business on the eastern side of the river, with the natural watershed for both portions of the city into the river. Following the natural flow of storm water, the citizens drained their streets, cellars and, later, their sewers, chiefly into the river and creeks within the city. In 1853 a system of public water supply was established by taking the water from Lake Erie within a few hundred feet of the shore at a point about half a mile to the west or above the mouth of the river. But about 1860, when oil refining began to be a large element in the city's productions, the refuse from that source being drained into the river and thence to the lake, it became apparent that the river water and some of its burden was at times reaching the intake point of the water supply. On this account, and to assure a supply of pure water for the future, a tunnel was constructed out

from the shore into the lake about one mile. And it may be stated in passing, that except when the surface of the lake is covered with heavy ice, no taste of oil or other sign of contamination of water supply from the river, has been since shown.

From its village days to 1873, when its population had reached about 135,000, the city had health organizations and health officers as emergencies or fears prompted. In the year mentioned, under a new State law, a board of health was organized, and either as a separate board or as the Board of Police Commissioners acting as a board of health, has existed and exercised functions ever since. Soon after its first organization the board secured the adoption of a rule excluding children from the public schools unless they had been vaccinated. And in order to secure a fair basis for estimate as to protection, free vaccination was furnished all scholars then in the schools. Since that time no child has been permitted to attend the public schools without furnishing satisfactory evidence of recent successful vaccination.

A "pest-house" was also established for cases of small-pox, and constantly maintained ever since. Some times a year or more has elapsed without a case requiring pest-house care, but the equipment has been kept up ready for any demand.

Another work of the Board of Health, early in its existence, was the renovation, and in some instances the destruction, of certain old and filthy tenements, which for years had been occupied by the lowest grade of emigrants. Patrolmen were appointed, instructed, and sent out to make inspection of all premises, and nuisances found were abated.

In 1876 the Board of Health was legislated out of existence and its functions assigned to the Board of Police Commissioners. During the following four years very little aggressive sanitary work was attempted or accomplished. Some instructions in regard to contagious diseases; some improvements as to gathering statistics were made, but none of the Commissioners had the interest or knowledge to press forward the work begun.

In 1880 the Board of Health was re-established with an intelligent and interested membership. A vigorous policy was adopted and put into effect. One of the first general measures was to stop the construction of wooden privy vaults. An order was made and issued that such vaults should be built of hard brick or stone laid in the best Portland cement, the wall coated on both surfaces with the same material, and the bottom filled to the depth of eight inches with concrete. This rule has been enforced ever since that time, while at the same time where sewers could be reached, new vaults unconnected with sewers have been prevented. In addition to a corps of sanitary patrolmen, a sewer inspector was appointed, whose duties included the inspection of plumbing, both as to new work and defective old work.

District physicians were employed to furnish medical care to the sick poor in their own homes, and to furnish free vaccination to those unable to pay for it. New contracts were entered into for the removal of night soil and house garbage, and the offensive trades were made to respect the comfort and well-being of their neighbors. Some of them, such as bone boiling, drying and grinding were ordered and forced out of the city, and as yet are kept out; while slaughter houses and rendering establishments were either improved and made endurable, or compelled to suspend.

During 1881 it was determined to placard all houses where diphtheria, scarlet fever, or small-pox existed; for the first a blue card, for the second red, and the third yellow, declaring the presence of the disease within. Strict quarantine, except in small-pox was not attempted, but the placard constituted a notice of danger and the nature of it. This plan has been continued, and it is believed has aided somewhat in the prevention of the spread of these diseases.

All deaths are reported by physicians to the Secretary of the board, and burial permits must be obtained in all cases before the dead body of any person can be buried or removed out of the city for burial. This rule is so enforced that very few, if any, bodies are disposed of without permission. All births are required to be reported to the Secretary by accoucheurs or other attendants, and although not so thoroughly enforced as the rule in regard to deaths, owing to the ease of avoiding detection, still the number unreported must be small as shown by the comparative birth and death rates. Also all of the dangerous contagious or infectious diseases are reported, and a record of the cases is kept, as well as a record of the deaths and births. The record of deaths and births has become the most complete and reliable of any kept in the county, and consequently is frequently consulted in connection with property questions.

There are now about five hundred miles of public streets and alleys, only about sixty miles of which are paved, mainly with stone. The Nicholson wooden block pavement has nearly all disappeared, although a few half rotten fragments remain. The same can be said of all forms of asphaltum pavement. There are one hundred and twenty-five miles of "main" and "branch" sewers built, with about seven thousand "house connections," and twenty-five hundred "catch basins." Of public parks there are seven, varying in size from one and a half to sixty four acres each, with a total area of about ninety-three acres. There are about two hundred and twenty miles of main and branch water pipes laid, with eleven thousand house connections. All the main and branch sewers are laid for both storm water and house sewage, and all discharge into Cuyahoga river within the city, or along the lake frontage of the city. About three-fifths of the city area is unprovided with sewers or ground drainage, and about two-fifths of the population dependent upon wells for their water supply.

Privy vaults are cleaned by contract at \$2.25 per cubic yard; the measurement determined by the sanitary patrolmen before the vault is cleaned, and corrected afterward. The citizens deposit the money with the secretary, where it remains until the patrolman certifies that the amount paid for has been removed. The contents of privy vaults and also all house garbage is put into a scow and taken out into the lake, eight miles, an officer of the board accompanying and directing each trip.

During the spring, summer and autumn the sanitary force is largely occupied in keeping yards and vaults clean. The city ordinance requires all vaults to be cleaned whenever the contents are especially offensive, or when the vault is filled to within two feet of the surrounding surface of the earth. In the winter the patrolmen are employed largely with the workshops, tenements, lodging houses, and all places likely to be poorly ventilated and overcrowded. The Board of Health has exclusive charge of all sewerage in private grounds, and all plumbing.

The powers conferred by the statutes of the State have been accepted and put into practicable form by city ordinances. The Health Department has an assured confidence, place and support in city affairs. Its yearly expenditures, for the last six years, have been from twenty to twenty-five thousand dollars.

The sanitary problems now demanding attention in the city of Cleveland, are those suggested at the outset as pertaining to nearly all of our lake cities: How to obtain and maintain a pure water supply from the source so abundant and so near, and still use Lake Erie as a receptacle for all the excreta and waste substances from a large city. Can these two demands upon the lake be rendered and kept compatible with the health of people so using it?

During the last six years, whenever the rainfall along the water-shed of the Cuyahoga River was small for a few weeks, the force of its current has been insufficient to clear it of the impurities drained into it. This deficiency in force of current is not all due to the small rainfall, but results in part from the large amount of water pumped from the river by the Standard Oil Co. and others for business purposes. The amount thus removed is at times greater than the entire inflow from above, and thus at such times there is a positive current up stream from the lake. From this condition there results a stagnation and deposit, with decomposition and effluvia, causing the boatmen and others engaged in business along the river nausea and often vomiting. People crossing the bridges, especially at night (in the summer), pass through a vapor loaded with the gases from the substances decomposing in the river below. These substances come from oil works, slaughter houses, soap works, tanneries, breweries, sewers and other drains. When large rainfalls occur the river is flushed and the deposit of weeks or months is carried into the lake. The problem presented for the relief of this condition is simply one of engineering, and

must be met and solved very soon or dire results to life and health may follow. A plan was suggested some years ago by Rudolph Herring, by which all sewage and other offensive drainage should be collected into one large sewer and carried so far down the lake as to keep the river pure and protect the water supply. Another plan has been proposed, *i. e.*, to pump river water out and convey it by tunnel to the lake below the city, and thus invite lake water in to take its place. But as yet neither has been done. The great resources of nature toward purification in such large bodies of water as Lake Erie are not forgotten or underestimated, but even in these nature must have something like an adequate opportunity. But for these great agencies in this respect, the citizens of Cleveland and other lake cities must have perished long ago from their own carelessness.

As time passes not only are individual cities and towns involved in these questions, but collectively, the entire territory depending upon the chain of great lakes for drinking water, is interested in their solution.

Analyses of water taken from Lake Michigan at Chicago, Lake Erie at Cleveland, and the Niagara River near Buffalo, made about two years ago, show that at that time the main bulk of water in these lakes was not injuriously contaminated by sewage. Neither the free ammonia, albumenoid ammonia, organic matters or other substances, showed any marked degree of change from analyses of several years before, or material difference in the samples obtained from the different points named. Of course the part of wisdom is to not reach the danger limit, but all will admit such a limit in this matter. It may be that national and international measures will be required for both rivers and lakes, where a joint use by States imperils the health of people depending upon them. Such legislation should anticipate the necessity for it.

The annual death rate of Cleveland for the last thirteen years has been between eighteen and nineteen per thousand of its population. About one-third of this number have died from zymotic diseases, thus showing most conclusively the demand for efforts to combat the influences which cause such a loss of life. The danger of remaining satisfied with low standards of health is an insidious foe to progress. Much self-delusion may be indulged in by the residents along these lakes, from the supposed healthfulness of their breezes and tempering waters. But while the deaths from acute and chronic lung diseases, from diphtheria, croup and cholera infantum continue as at present, no such comfortable hallucinations can mislead sanitarians in their estimates of present conditions and future possibilities.

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Dr. J. S. Berry].....	Locust Grove.
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Dr. E. E. Kirk	Flushing.
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Dr. W. A. Knowlton.....	Brecksville.

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Dr. L. D. Brumm.....	Coldwater.
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Dr. A. Scheibenzuber.....	Dayton.
Dr. J. C. Reeve.....	Dayton.
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SHELBY COUNTY.

Dr. C. E. Johnston	Sidney.
Dr. E. A. Steely	Anna.
Dr. G. M. Tate	Botkins.
Dr. J. F. Miller	Port Jefferson.

SANDUSKY COUNTY.

Dr. O. H. Thomas	Fremont.
Dr. J. D. Bemis	Fremont.
Dr. Mary Starner	Fremont.

STARK COUNTY.

Dr. Leon B. Santee.....	Marlboro.
Dr. Edward Williams.....	Canal Fulton.
Dr. P. M. Welker	Alliance.
Dr. J. M. Crawford	Minerva.
Dr. F. E. Favret	Louisville.
Dr. W. O. Baker.....	Louisville.
Dr. J. L. Beuclair.....	Louisville.

SUMMIT COUNTY.

Dr. Seth Freeman	Twinsburg.
Dr. G. L. Starr.....	Hudson.
Dr. B. B. Brashear.....	Akron.
Dr. W. S. Hough	Cuyahoga Falls.
Dr. R. S. Hubbard.....	Northfield.
Dr. A. H. Bill.....	Cuyahoga Falls.

TRUMBULL COUNTY.

Dr. W. J. Haine.....	West Farmington.
Dr. C. M. Rice.....	Newton Falls.

TUSCARAWAS COUNTY.

Dr. A. F. McLean.....	New Philadelphia.
Dr. J. R. McElroy	Newcomerstown.
Dr. A. F. Miller	Shanesville.
Dr. S. R. Thompson	Uhrichsville.
Dr. F. H. Brannan	Canal Dover.
Dr. L. Hattery.....	Boliver.
Dr. J. A. Hawthorne.....	Port Washington.
Dr. C. E. Brothers	Mineral Point.
Dr. J. W. Haverfield	Uhrichsville.

UNION COUNTY.

Dr. Elmore Y. King	Richwood.
Dr. W. H. Wills	Milford Center.
Dr. F. A. Vigor.....	New Dover.
Dr. W. B. Taylor	Broadway.

VAN WERT COUNTY.

Dr. W. M. Fredenburg	Convoy.
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FIRST ANNUAL REPORT.

VINTON COUNTY.

Dr. J. E. Sylvester McArthur.
 Dr. T. W. Prose Wilkesville.

WAYNE COUNTY.

Dr. L. P. Grill Orville.
 Dr. C. L. Kinnaman West Salem.
 Dr. P. S. Greenamyre Smithfield.
 Dr. D. G. Roebuck Dalton.
 Dr. W. S. Battles Shreve.
 Dr. E. E. Ash Fredericksburg.

WASHINGTON COUNTY.

Dr. A. S. Clark Beverly.
 Dr. C. K. Andrews Heslop.

WARREN COUNTY.

Dr. F. H. Darby Morrow.
 Dr. L. Pample Cozaddale.
 Drs. Cowden and Mounts Morrow.
 Dr. J. M. Van Dyke Mason.
 Dr. J. B. Collins Butterville.

WILLIAMS COUNTY.

Dr. G. Starner Blakeslee.

WOOD COUNTY.

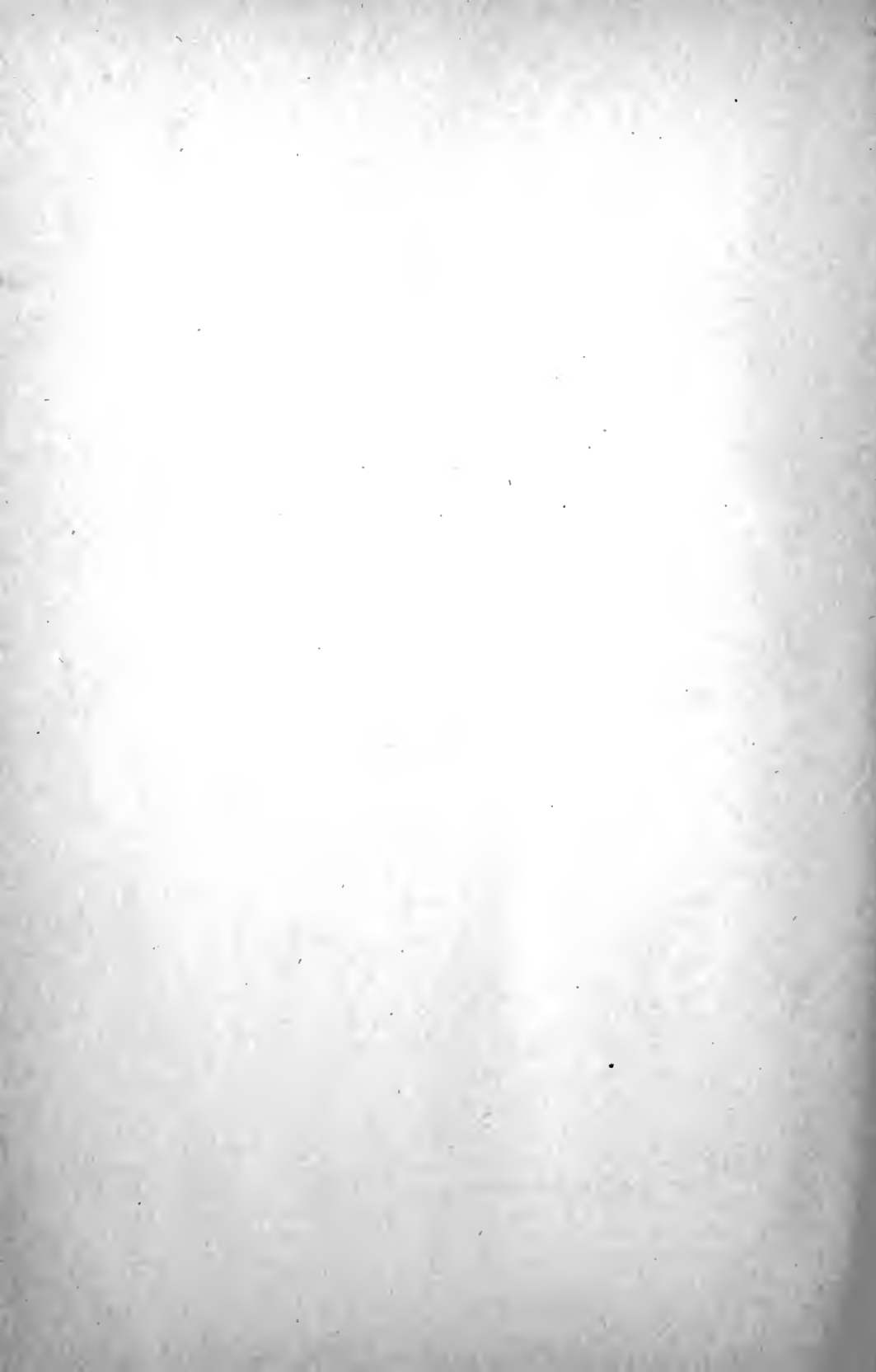
Dr. W. M. Tuller Bowling Green.
 Dr. G. Higgins Bowling Green.

WYANDOT COUNTY.

Dr. J. N. Bowman Upper Sandusky.
 Dr. A. A. Royer Carey.
 Dr. A. H. McCrory Nevada.
 Dr. F. W. Brayton Carey.
 Dr. R. S. Souder Nevada.

SUPPLEMENT
TO THE
REPORT OF THE OHIO STATE BOARD OF HEALTH.
1887.

STATE SANITARY CONVENTION.



PROCEEDINGS, ADDRESSES AND DISCUSSIONS
AT THE
STATE SANITARY CONVENTION.

HELD AT
WARREN, OHIO, MARCH 30 & 31, 1887.

[This report of the convention is prepared from papers furnished by the authors, from accounts of the convention printed in the Warren Daily Chronicle, and from notes by the Secretary.

Papers were abbreviated, in some instances, where the same ground had been covered of by another.]

The convention was held in compliance with an invitation from the citizens of Warren, and under the direction of the State Board of Health and a committee of citizens. The following persons constituted the local committee:

LOCAL COMMITTEE.

Julian Harmon, M. D., A. C. Hunt, M. D., H. A. Sherwood, M. D.; Harmon Austin, M. S. Clapp, P. L. Webb, Wm. G. Watson, S. W. Park, Junias Dana.

Dr. T. Clarke Miller, of Massillon; Dr. S. P. Wise, of Millersburgh; Dr. D. H. Beckwith, of Cleveland and Dr. C. O. Probst, of Columbus, represented the State Board of Health.

FIRST SESSION.

WEDNESDAY, March 30, 1887—2 P.M.

The convention was called to order by Dr. Julian Harmon, Chairman of the local committee.

Prayer was offered by Rev. H. J. Reimann, of Warren.

Dr. Harmon announced that owing to continued illness, Mayor Ward could not be present, and that Mr. M. S. Clapp would give the address of welcome.

Mr. Clapp then delivered the following address:

Gentlemen of the State Board of Health:—We welcome you to our city, to the hospitality of its homes, and to whatever good cheer you may find here to stimulate and aid you in the beneficent work before you. Fully do we realize that *disease* is the great universal enemy of mankind, in all ages, in all climes, and in all stages of civilization, and is burdensome in all conditions of life. Sickness befalls the infant, the youth, the prime of manhood, and the declining years of age. Death strikes us

at any time, any where. When we consider any *one* of the evils of life we are amazed at its extent and the destruction it causes. But no one is so relentless and wide-spread as *disease*. Earthquakes, tornadoes, shipwrecks and railroad disasters are appalling incidents; so, too, are cholera, yellow fever and other epidemics. But the victims of all these are few compared with those who fall beneath the sway of prevalent *diseases*. The cost, the anxiety and distress which are entailed upon mankind by ordinary sickness is beyond comparison. May we not hope to escape all, or some part of them?

"Behold, how beautiful upon the mountains are the feet of those that bring glad tidings—that bringeth glad tidings of great joy."

You, gentlemen of the State Board of Health, and you, gentlemen from abroad, co-workers with them, and you aiders here at home, all of you, are but swift messengers from the mountains of sanitary science; your tidings are good—growing better day by day and year by year. We feel sure that the prevention of diseases as well as their cure, is fast becoming a science, and as clearly demonstrated as geology or chemistry.

If what is now known to sanitary science, were thoroughly understood by every man, woman and child, what a transformation would be wrought; happiness and contentment would perch upon her throne, and sorrow would vanish in mid-air. We bid you welcome, therefore, with no more formality of words, but with hearts thrilling with the glad tidings you publish; and may grim disease, in the near future, fall a victim at your feet.

And to those ladies and gentlemen present, we bid you welcome.

This sanitary gospel, thank God, is free, the glad tidings are for all. We are glad that you are here to receive it, and may we carry its teachings into our homes, into our city and throughout the world. Again, we say to you all, welcome, thrice welcome, and may God speed you in your good and great work.

In response to the address of welcome, Dr. T. Clarke Miller, President of the State Board of Health, spoke as follows:

It gives me great pleasure to return thanks for the cordial welcome extended to the State Board of Health, and to those who have entered so heartily into the work of making this meeting a success. The Board is less than a year old, having been organized in May, 1886. It is composed of seven members, appointed by the Governor, the Attorney-General, *ex-officio*, and a Secretary, elected by the Board, who is its executive officer.

The purpose of the Legislature in passing the act creating the State Board of Health, as well as the work it expected of that Board, is well set forth in Section 2 of the act, a part of which reads as follows: "They shall make careful inquiry in respect to the causes of disease, and especially the invasion or spread of any infectious or contagious, epidemic or endemic disease, and investigate the sources of mortality, and the effects of localities, employments, conditions, ingesta, habits, and surroundings on the health of the people; and shall investigate the causes of diseases occurring among the stock, and domestic animals of the State; the methods of remedying the same, and shall gather information in respect to such matters, for dissemination among the people." The object of this convention is a double one; first, in the language of the act to "gather information," second, "to disseminate such information

among the people." The State Board is anxious that this convention may be creditable to the State of Ohio, and to your city, the first in Ohio to offer her assistance and hospitality, thus making the holding of such a convention a possibility. The great State of Ohio has been slow to take the first step in the great sanitary reform of the past few years; within a year, however, she has stepped boldly out with an appropriation amounting to about twelve and one-half cents to the square mile of her territory, perhaps one-seventh of a mill to each member of the population. This may not seem a munificent provision, considering the boundless field so long neglected, and yet some important States have done much less. The State of Mississippi, which is so located as to have learned to appreciate organized sanitary effort, makes very liberal appropriations to its State board of health. We have happily been exempt from great epidemics, and perhaps are not so wide-awake as we ought to be in these matters, nevertheless, the deaths which annually occur in our State from preventable causes would constitute an army of spectres which we might well dread to face, who might have been saved by a well directed expenditure less in amount than the cost of their funerals.

One of the wise men said that "a man at forty is either a physician or a fool." I take it this means that if a man at forty has not learned a good deal about taking care of himself, his willful ignorance is likely to bring about his death prematurely. This question of taking care of one's self touches on hygiene and sanitary science at every point, and the proposition may be restated as follows: The man who at forty does not appreciate the importance of personal hygiene and public sanitation, is not sufficiently intelligent to be considered a creditable citizen of the State of Ohio. Physicians, being constantly brought into contact with the results of insanitary surroundings, and being engaged in a struggle with preventable disease, become perforce, if not from choice, the leaders in sanitary reform.

The wise and cultured Greeks recognized Esculapius as the father of Hygiea, and to this day the followers of the father are, or ought to be, the patrons of the daughter. Yet, it is a curious fact, that occasionally the relationship between the god and goddess is called in question, and it is somewhat aggressively claimed that the father of Hygiea was an architect or plumber. The medical profession, however, still holds to the legitimate and close relationship existing between prevention and cure. We have no disposition to withhold the credit due to those architects and plumbers who are so nobly pushing sanitary reform in their departments. They are indispensable to progress, but they have no sanitary traditions, and the moss covered medical profession will be slow to abdicate the leadership in their favor; but I wish to say right here that abdication or deposition is not inconceivable. The physician must qualify himself as a sanitarian, or the times will out run him. The medical colleges must make a chair of hygiene and sanitary science which shall be as important in the faculty, at least, as it dares to be in the announcement. The demands of the people for men, competent to advise them in the preservation of health and the prevention of disease, must be satisfied. Why should medical colleges be content to turn out yearly, thousands of young men, qualified, if you please, to mend the pocket after the precious kohinoor of health has been lost. Would it be asking too much that the man who treats your honor, when sick, should be able to trace that sickness to your sewer connections or your neighbor's cess-pool, and thus save your household from the malign effects of the same cause which prostrated you?

Lessons in hygiene should begin in the primary schools and extend through what

we are in the habit of calling the educational period of life, or rather, to state it differently, sanitary education should begin with the superintendent, and extend through all grades of teachers to the kindergarten. The school that does not take care of the growing bodies of its children, however faultless its curriculum may be, does much less than half what the people have a right to expect of it. What a monument of pretense, is the school that reeks with foul exhalations. A thoughtful sanitarian has said that "a man's worst enemy is his own health." What then is the wisest teacher to do with seventy children, most of them not over clean, in an air-tight box?

Our school boards will tax us for improperly constructed buildings. They will tax us for fuel, for teachers, for apparatus, and even for a re-election to their lucrative offices, and this convention will not be in vain should a board here and there be encouraged to place an additional fraction of a mill on our reluctant shoulders, in order that our gasping and panting babes may have a beggarly allowance of fresh air. Ignorance and parsimony are constantly pulling as a double team, against all sanitary effort.

The croakers say, (blessed be the croakers,) that we used to get better men and women out of the old school house through which the wind whistled twelve months in the year, (though it whistled through the school but three,) than we do now out of our air-tight, over-heated institutions, built to be looked at, which are open, (that is shut up) for school almost the whole year, and, bless their old hearts, they conclude that those superior men and women, their contemporaries, were made of better stuff. It is barely possible that this conclusion is not altogether warranted.

I venture to question whether half the school rooms in Trumbull county have any provision whatever for ventilation? They were built to shut the air out and keep the heat in. The effect, however, is to save fuel at the expense of human life and health. Blood is cheaper than coal, and health is lavished to save fresh air. Do you know that the terrible disease, tubercular consumption, is born and bred in re-breathed air, that its intrenchments are not to be assaulted, to any purpose whatever, except on the sanitary side; that its ravages will continue to increase to our shame and destruction, until we are ready to bring all the artillery of sanitary science to bear on it? Yet your school director puts his thumbs in the armholes of his vest, and proudly reminds you that Trumbull county is on the Western Reserve, and the Western Reserve is the cerebral portion of Ohio, and Ohio, though not the home of the President, is the home of the next President. "If the righteous scarcely be saved," etc. There is a way to suddenly reform these almost criminal school boards; do you want to know how it can be done? Just tell them that the climax of success, in their management of schools, will never be indicated by the minimum expenditure per head; that if Youngstown can educate its children for a few cents less per head, per annum, the presumption will be that Youngstown does not do its work so well.

How many of us were ever in a well ventilated church? Who would not contribute to a fund for the erection of a monument to the architect who plans such a church, to the contractor who builds it, and to the building committee which does not defeat both architect and builder, in order to save a dollar or two?

That church will be a noble and eloquent monument as long as some steam fitter does not close up its breathing holes, and go to heating it by direct radiation.

Some people who think what they wish, say that the churches are losing their

hold on the people. Would it be so very strange if the grip should relax under the benumbing and demoralizing influence of air breathed and rebreathed, till the temples throb and the ears ring and the eyes stand out from their sockets? There was a time, as some of you know, when the sermon was forged on the pommel of the saddle, and delivered glowing and pungent, under the trees or in the cabin before the blazing fire, when the churches had a grip that people could feel, and the skeptic could not deny, from which there was little chance to escape, except by early and precipitate flight. If there is a minister of the gospel here, and there ought to be many, (possibly they have not arrived yet,) I beg of you to consider how effectual foul air may be as an ally of the devil. How often have you seen your best efforts fall lifeless, asphyxiated? The clergy have enviable opportunities, and opportunity is the gateway of duty, to teach the people how to live, how to live hygienically in this life. How much of duty may we neglect in this life and be sure of the life hereafter?

The leaders of the blind must see things in their proper relations, or the whole party will be ditched. When I have stood in the reeking and mephitic atmosphere of the court room and noted, before my faculties died, the congested and expressionless face of the judge on the bench, the imbecile stupor of the jurors, and the pitiful frenzy of the counsel, I have wondered, before I was too far gone to wonder at any thing, if justice might not sometimes miscarry by reason of crowd poisoning. Carbonic acid is probably the most innocent ingredient of the poison with which the air is loaded by the delectable, dirty crowd which takes a morbid delight in hearing its favorite develop the truth, (as the lawyers always do, whether it helps or hurts their case.) Lawyers should be great patrons of sanitary conventions, and they will no doubt be here in force soon.

The time has come, owing to the advance in sanitary science, when a sanitary engineer might any day take a contract, and give bonds for its fulfillment, to reduce the death rate of Warren, for the next five years, twenty-five per cent. below what it has been for the last five.

Why should you intelligent people stand idly by and see your water courses polluted, cities drinking the sewage of those higher up the stream, your neighbor maintaining a cess-pool, or a vault, to poison your well as well as his own?

How long will the enlightened people of Ohio continue to sleep short naps between preventable funerals.

I hope all here will take an active part in the convention, discussion is open to to all. The State Board of Health would request, if there be no objection, that in selecting your officers the Secretary of the Board be made Secretary of the convention.

The following list of officers was read, and, on motion, adopted :

OFFICERS.

President, Prof. E. A. Jones, Massillon; first Vice President, Dr. J. Harmon, Warren; second Vice President, Josiah Hartzell, Esq., Canton; third Vice President, Dr. D. H. Beckwith, Cleveland; fourth Vice President, Dr. D. B. Woods, Warren; Secretary, Dr. C. O. Probst, Columbus; Assistant Secretary, F. M. Ritzel, Warren.

After a short address by Prof. Jones, in which he expressed himself as in hearty sympathy, as an educator, with this movement, the first paper of the programme was read as follows:

DRAINAGE AND SEWERAGE OF WARREN AND VICINITY.

BY S. F. DICKEY, ESQ., CITY ENGINEER OF WARREN.

In the spring of 1866 the city council of Warren adopted a system of sewerage for a part of the city. During that year the work of building the sewer was commenced under the supervision of James Dana, city engineer. The entire length of sewer is about five and a half miles, 897 feet of which is brick, egg-shaped, 45"x33"; 1,681 feet, 33"x26 $\frac{3}{4}$ "; 3,452 feet, 27"x23 $\frac{1}{4}$ "; 572 feet, 20"; pipe, sewer, 971 feet, 18"; 400 feet, 15"; the remaining 21,000 feet is nearly all 12" pipe, all of which is the Akron sewer pipe. The grade of the brick sewer is laid at an inclination from 6" to 3" to one hundred feet; the pipe is from 3" to 2" per hundred feet.

The sewers are all laid with inlets for surface drainage, as well as house sewerage catch-basins are put at all changes of grades of streets, as well as at all block corners. The surface water is the only means used for flushing the main and branch sewers.

About twelve hundred feet west from the east line of the city, a stream known as Red run flows southerly, in a line nearly south, emptying into the Mahoning river within the city limits. This leaves a strip of land about sixteen hundred feet wide, extending from Scotts street north, which has not at present any provision for drainage, excepting what may pass off by way of Red run. This has been considered, but as yet no definite plan has been adopted. Looking at the present prospect of the future growth of that part of the city, it would seem that the time is not very distant when some way of drainage will be a necessity.

For twenty years our main sewers have been in use; they have been taxed to their utmost, yet there has been no serious breaks, and the expenditure required to keep them in order has been small.

The Mahoning river flows through the city in nearly a south, southeastern direction, entering the city limits at the northwest corner, and crossing the south line about 3,000 feet west of the southeast corner. This leaves about one-third of the territory of our town west of the river, the inclination of the surface of which is toward the river.

The limited number of dwellings back from streets running parallel to the river, and adjacent to it, thus far has not made sewerage an absolute necessity.

Near the northwest, west and southwest part of the city are three small streams flowing northerly, easterly and southerly, and emptying into the river. These streams have an average inclination of about thirteen feet to one mile, while the inclination of the surface is largely towards these streams, rendering that part of the city free from pools or marshy ground.

South of South street and east of the river, there is no sewerage. But if the main sewer should, at any future time, be carried to the river, an outlet will be provided which will drain that part of our town as thoroughly as the nature of the ground surface will permit.

I wish to say in conclusion that, although at times of severe floods, some of the property owners have been annoyed by the back water in their cellars, yet as a whole our sew-

ers have been a success, and have added largely to the comfort of all property owners where they are located.

The President suggested that the discussion be postponed until after the reading of the next paper, which was a continuation of the same subject.

The following paper was then read:

EPIDEMICS PAST AND PRESENT IN THE CITY OF WARREN.

BY D. B. WOODS, M.D., WARREN.

Before entering upon a detailed history of the past sanitary condition of Warren, it is only just to myself to state that any intimate knowledge of our city and vicinity dates back to only forty-seven years ago, when the writer became a resident of the place, when nearly in its infancy. But most of the allusions embraced in this paper had become matters of memory tolerably well fixed, in the long period of professional experience.

A brief allusion to the topography of Warren may be thought advisable, as furnishing a key to many past forms of disease, which, otherwise, to those not familiar with northeastern Ohio, might not be fully understood.

Warren is situated on the Mahoning river, which flows nearly diagonally through the town from northwest to southeast. It is only about five miles southeast of the water-shed, from which brooks and rills flow northward to the basin of lake Erie, and south by eastward to the Ohio river.

Fifty years ago much of the summit level was woodland and extensive marsh, embracing many hundreds of acres. The Mahoning river, with its affluents, Eagle, Duck, Meander and Mosquito creeks, generally flow in an easterly and southerly direction. Three-fourths of the country through which these streams flow is comparatively level, and the soil, especially in this vicinity, is composed largely of alluvial and diluvial formations: while much of the adjacent territory consisted of primary soil from decaying vegetation, resting upon an almost impervious clay or hard-pan.

At the period of which the writer has knowledge of this section of Ohio, much of the country was clothed with the native forest growth; with scarcely any effort made at artificial drainage. About 1840 the Pennsylvania and Ohio canal had been completed from Akron, Ohio, to New Castle, Pa., which afforded no increased facilities for drainage, but did add an increased surface of stagnant water, with a profuse growth of vegetation to contaminate, by its malarious exhalation, the already surcharged atmosphere.

From this condensed survey of the topography of Warren, it can readily be inferred that with numerous marshes within a few miles of our city, with annual overflows of the banks of the Mahoning, with the immense amount of debris deposited on the low lands, composed in part of decaying vegetable matter; while the more elevated portions of the clay soil are underlaid with hard-pan, we can perceive that with certain hygrometric conditions and high temperatures all the elementary factors necessary to induce many forms of disease were present. Coupled with all the natural and artificial conditions, which in themselves might constitute sources of disease, at the time (forty-seven years since) at which my knowledge of our city began, little or no effort had been made by drainage or otherwise to improve the sanitary condition of

the place. In fact, quite a marsh and frog-pond yet existed in the center of the town, occupying the whole center square; besides others in the north portion of the city limits, with deep mire holes in many portions of the street, while the street scavenger found no occupation in removal of the piles of accumulated filth, which filtered into wells and diffused their poisonous exhalation in the air. Apropos to which, the writer was present when a conversation between the mayor of our town and a well-know physician occurred. His honor inquired how much the said physician would contribute to drain the center square cat swamp. The reply was, "not one cent, as every house around had among its inmates more or less sickness, and it would not do to diminish the medical revenue." *The swamp was drained.*

The sanitary condition of Warren at the present time, as compared with that of half a century ago, can be best told by brief references to the epidemics of the past, of fevers, dysenteries, scarlatina, etc.

The winter of 1840 and 1841 was remarkable for much rain, and an average high temperature, with changes. Scarlatina and synochal-typhus were rife, and wide spread in this vicinity and the adjoining townships. The attacks were generally severe and terminated fatally in numerous cases. The three following years the type of disease changed, and we were scourged with true typhoid fevers, erysipelas and puerperal fever, the last of a peculiarly malignant form. Down to 1845 the summers were marked by the general prevalence of dysenteries. But, after the canal had been operated for five years, with the first comparatively healthy summer, in the autumn of 1846 malarial disease became prevalent in the form of agues, billious fever, dysenteries and diarrheas; and for several successive years residents, along the whole line of the canal, as well as the Mahoning and all its tributaries, were, during the summer and fall, afflicted with those diseases, to be succeeded during each recurring winter by pneumonias. But the worst effects of the malarious elements were reserved for the year 1855, in which to develop the most malignant types of the diseases as well as the greatest number of cases. The spring of that year opened upon us with much rain, with many storms of thunder and lightning, and with prevailing high temperature. The soil about Warren and the adjacent townships was thoroughly saturated with water and emitted exhalations of the most noxious character. Five different times the Mahoning and the smaller streams inundated all the low grounds along their courses. If my recollection be not at fault there was no house in Warren or the surrounding country that escaped the effect of the malarious poison.

Succeeding years, down to the winter of 1858 and 1859, presented a continuation of similar types of disease, modified by season, and, perhaps, by some feeble efforts at better sanitation. At this time diphtheria became widely prevalent as an epidemic and in adjacent townships like Fowler, Vienna, etc., with no considerable alluvial soil, the disease was extremely fatal; much more so than in our city, where the supposition was entertained that malarial causes had essentially modified the fatality and severity of the attacks.

But for the last twenty years, since the streets of the greater portion of our city have been thoroughly drained by a system of deep sewerage, followed by hard pavements, greater care to secure purity in drinking water, and the prompt removal of accumulations of filth and garbage, our city has not been scourged by any serious epidemics. While, yet during every year at some periods, physicians meet with types of nearly all diseases, the attacks have not been so severe or fatal as formerly. Owing to better methods of tracing and estimating the sources of disease, physicians seldom fail to

ascertain the origin of the various forms of affection, when especially dependent upon local causes.

In the experience of the writer, only within the last five years, typhus fever became localized on one of the streets of our city, which was tracable to the escape of sewer gas in the vicinity of the homes of those affected by the disease. In another instance, in the country, a whole family became affected with the fever, which was subsequently found to result from the use of well water which had become poisoned by leakage from a defective drain. In another instance, two lives were lost, and three others were made severely ill of malignant dysentery from the use of impure drinking water, which, when discontinued and pure water substituted, was followed by prompt recovery. Many other facts of a similar character, showing the invaluable aid of judicious sanitation, not only in preventing but in successfully curing cases already sick, might be enumerated.

I close my somewhat cursory review of the various epidemics that have affected us, in different years, by stating the fact that for the last twenty years we have been comparatively exempt from those which formerly prevailed so generally, and that we have made important advances in the right direction, in a better avoidance of disease-producing causes, by the introduction of the most essential sanitary measures, to which allusion has been made; yet much remains to be done. We, of this age of advanced civilization, at the close of the nineteenth century, have not approached the successful efforts of the ancient Grecian or Roman methods and measures for the prolongation of human life, or the preservation of the public health. This general indifference as regards attention to public health may be accounted for in many ways. The public mind and public authorities are engaged in the prosecution of various associations and business pursuits, which occupy the whole time and energy of communities, and the time required for the establishment of thorough and systematic sanitary measures, is grudgingly used for such purposes, and even when some spasmodic efforts is made towards such regulations for promoting the general good, the details and execution of such inefficient rules and ordinances, as may be proposed, are left to the discretion of persons in many instances even more inefficient than the methods sought be enforced. All such measures require, besides public consent, much intelligent consideration and observation, and the use of considerable time and money, and it is only in great emergencies, when whole communities are threatened by some direful scourge, that the popular voice will call loudly for efficient and oftentimes unreasonable restrictions and expenditure of money, to protect them from the impending calamity.

Discussion.—Dr. McCurdy asked if house connections were numerous, and and if means were provided for flushing the sewers.

Mr. Dickey stated in reply that many house connections had been made, and the only means for flushing sewers was by storm water. The city was just completing water works, however, and an abundant supply of water would soon be had.

Dr. Miller doubted the wisdom of sewers without water works; in such cases they were too often but hot beds for breeding disease.

Dr. Smith, of Warren, said they had had no serious epidemics of any kind since putting in their sewers; prior to this they were common. Their sewers

were well ventilated, and they noticed no particular trouble from them in hot weather.

Dr. Harmon testified to the great benefit sewers had been to Warren. Before their construction, diphtheria, dysentery and allied diseases were of frequent occurrence, now they were not often seen.

He assigned, as a reason, that cellars which used to be damp and at times partly filled with water, were now dry; also, their streets were greatly improved by having the storm water immediately carried off.

Dr. Herrick said the subject of disposal of waste products was a complex one. The people of Warren, living in an agricultural district, were losing valuable waste matters which should enrich the soil, and were, in addition, polluting their rivers, to their own and their neighbor's detriment. They must look ahead fifty years to the millions for whom food must be provided, and "gather up the fragments that nothing be lost."

Professor McMillen endorsed this idea, remarking that, to his knowledge, land which fifty years ago produced three tons of hay to the acre would not at the present time produce one.

The next paper read was as follows :

RURAL SANITATION.

BY LEW SLUSSER, M.D., REGISTRAR, CANTON, OHIO.

The sanitarian aims to search out the avoidable causes of sickness, and to admonish the people to live in accordance with the laws of nature, thereby avoiding many evils that otherwise they must endure. While the medical profession has done much to relieve human suffering attributable to accident or indiscretion, it has not hitherto taken that interest in discovering and endeavoring to remove the causes which operate to produce ill health.

It is well understood and acknowledged that there are vast and wholly unexplored fields in the province of preventive medicine. The principles of hygiene law, are coeval with the creation of man; yet never since the days of Moses, has it received the attention its importance demands. All classes are subject to its control. Those who observe its edicts, are happy in the enjoyment of health, and those who defy its authority, pay the penalty in sickness or in death. Public hygiene is yet in its infancy. Certain forces are at work producing sickness, and an immense amount of drugs is used to counteract the evil tendencies thus engendered, while not sufficient attention is given to the causes that have occasioned the sickness, the removal of which would restore health, without the use of medicine. We study the symptoms and effects of disease, but do not investigate its source with anything like the same thoroughness. We are not yet satisfied whether a given disease, say diphtheria or typhoid fever, is developed from the germs, from invisible and indefinable miasma, through tendencies inherent in the individual, from his surroundings or long continued personal habits. The importance of this branch of medical study is daily becoming more patent, and will constitute the foundation of a large part of the medi-

cal practice of the future. In the language of a forcible writer, "Hygiene aims at rendering growth more perfect, decay less rapid, life more vigorous, death more remote."

By rural sanitation we mean the care given by the farmer to himself and family, and in the management of his surroundings that have a bearing upon health.

There is a general impression that because the air is more salubrious, and the water less contaminated in the country than in the city, there must be less sickness and fewer deaths in proportion to population in the former than in the latter. This, however, is a mooted question, with vital statisticians, and until our legislature provides by law, for a correct mortuary registration, both for town and country, the question cannot be accurately determined; but this much, bearing upon the subject, is known, that there are more men and women belonging to the agricultural class, now in the insane asylums of our State, than of any other single class. This fact being established, the question suggests itself to the sanitarian: What is there, in the life and habits of the farmer, or the farmer's wife, that should render either more liable to contract mental disease, than the habitue of town?

Alienists assert, that an unsound mind has its origin in an unsound body; that before there can be an impaired condition of the intellect, there must be disease of the brain, or morbid change of structure. The insanity may be excited by a moral cause, but had the body been in a sound, healthy condition, no moral cause would have operated to produce alienation of mind, hence it may be safely averred, that there must be something in the surroundings of a farmer's home, or in the habits of the farmer and the farmer's wife, deleterious to the health of body, not common to others, that they should suffer disproportionately with sickness.

We will venture to designate a few of the causes, which, in our opinion, operate to militate against the health of the farmer's family, especially those in comfortable circumstances, and who live as the world goes, in good style. Let me not be misunderstood. I would not condemn the present style of living, as contrasted with that of our ancestors, only so far as it operates against the enjoyment of health. Change is not always improvement, and while the luxurious style of living indulged in by many at the present day, may afford temporary pleasure, the fact has been made plain, that improved health of body has not always followed; on the contrary, new forms of sickness have arisen, like diphtheria and nervous prostration, which are not the result of change in the "epidemic constitution," as Dr. Kirtland was wont to term it, but directly traceable to local causes, domestic and personal habits.

You observe in riding over the country many rural homes of pretentious appearance, with the outside window blinds invariably closed. If you were not constantly on the lookout, for causes that produce sickness, it would probably not excite a thought, other than, possibly, that the woman of the house, was considerate of her carpets and window drapery. It may never have occurred to you, that within the chambers of that house, were being nursed the seeds of sickness and death. The good housewife does not know that by the exclusion of sun-light and fresh air, she invites consumption, that fell destroyer of this climate. Many of our fatal diseases have their origin in a close, vitiated atmosphere. Experience has proven, over and over again, that health and comfort are promoted by allowing the fresh air and sun-light to permeate every nook and corner of the dwelling. It will do more good than any amount of disinfectants to purify and sweeten the air, and render it fit for breathing. Those outside blinds should be opened daily, as also the windows, that

the air and sun-light may have free access. Viewing it in the light of profit and loss, the advantage in the improved health of the inmates, will more than compensate for the injury to the carpets. In the occupied sleeping rooms, the sash should be lowered, in order to admit fresh air at night. The prejudice entertained by many against night air, is from ignorance, and should be dispelled. The out-door air is purer than that in the room, and of better quality. Since God created man, and breathed into him the breath of life, that breath of life has been to him the one thing essential to his living. He can subsist upon offal, go naked and hungry, sleep on a barren rock, and yet live, but deprive him of air and he dies. Poison that air, and he sickens. Do you immure yourself, or your children, day or night, in rooms where foul air has no exit, and pure air no entrance? Do you congregate in churches to hear the word that is to save your souls, and have implanted in your lungs the seeds of malign growth that will destroy your bodies?

It has not been many years since a religious revival was being conducted in a country church in this State. It was in the winter, the weather cold, and in order that the congregation be comfortable, it was necessary to keep up a strong fire, and the windows down; no fresh air had access, save that which occasionally came through the door. The house was crowded during the evening exercises, and you can imagine the condition of the atmosphere within. This had been going on several weeks, when a case of typhoid fever was reported in the neighborhood. Soon another and then another, and it was not long until the disease was endemic, and a number of deaths occurred. The public became alarmed, and there was much speculation as to the exciting cause. Inquiry developed the fact that the first case had been attending the protracted meeting. Tracing up other cases, it was discovered that all who had been taken sick, attended the meeting. This directed attention to the church, and an examination of the building revealed the fact that there was a collection of water underneath the floor. This had become putrescent, and in a condition to generate deadly gases, disease germs, which were drawn up through the interstices of the floor, by the heat above, and, being inhaled by the congregation, produced sickness in those susceptible to its influence. A very limited knowledge of hygiene, which should be made a branch of study in our common schools, would have saved that community from a great infliction.

It is the custom of many of our farmers to store fruits and vegetables in the cellar, and to protect them from the frost, close every avenue to the admission of fresh air. During the winter the vegetables are likely to decay, and in that process, generate and eliminate cases that are deleterious to health. These gases are drawn up and mingle with the purer atmosphere of the occupied rooms above, and the consequence is, members of the family complain of not feeling well; some are subject to headache, others to nervous prostration, a disease of modern growth. Should a member of the family be stricken down and die, it is attributed to divine providence, whereas, providence had nothing to do with it. It was the rotten apples, stinking cabbage, mouldy straw, decayed potatoes, and the close condition in which the upper rooms were kept.

Farmers are at fault in not providing a proper receptacle for the storage of manure. The practice of dumping it in the barn-yard, allowing the fertilizing qualities to drain away in filthy streams, polluting the atmosphere, or soaking into the gravel and finding its way into the spring or well. All that is necessary to correct and improve this fault, is to excavate the ground where you wish to collect the manure,

down to the clay, in the shape of a bowl, and plaster the bottom with hydraulic cement. This will prevent any escape.

The hog-pen, which you so often find located near your home, if not calculated to breed sickness, is demoralizing in its influence, and should be abated by removal to a greater distance from the family dwelling.

It is not uncommon for the housewife to throw slops upon the ground near the kitchen, a reprehensible practice, and calculated to breed sickness. Diphtheria and typhoid fever have been traced to this slovenly habit. The personal habits of the average farmer needs amendment. I have had occasion to know many farm hands, working in the harvest field, or seeding during a hot, dusty day, perspiring freely, their underclothes stiff with dirt, go to bed in these same clothes, guiltless of ablution or absolution. How much more comfortable they would feel and how much more refreshing would be their sleep, if before retiring, they would accustom themselves to a sponge bath and a night shirt. A prominent writer on scientific subjects has said, "the civilization of a people is indicated by the amount of soap they use."

Farmers, as a class, are more reckless in exposing themselves to inclement weather than men engaged in other pursuits. The house carpenter, the bricklayer and the common street laborer in our towns, leave their work and seek shelter during a rain, while the farmer will continue mauling rails or making fence until soaked with rain; not because he is lacking in sense sufficient to get out of the rain, but because his father and his grandfather would not be driven from work by a shower, and he does not wish to be considered effeminate, though his fool-hardiness will be likely to bring on rheumatism and premature old age. There was an apology for our forefathers, in the early settlement of this country, working from daylight until dark and in all kinds of weather, but at the present day, that necessity no longer exists, and any man or woman who needlessly exposes himself or herself is guilty of criminal average, and should be dealt with by the humane society.

And now the question may be properly asked, what have you to recommend as a corrective of the errors of omission and commission imputed to the rural citizen, who constitute the most important factor in our body politic? My answer is, a more general diffusion of knowledge among them, and a disposition on their part to cultivate a taste for reading. It is a notable fact, that a large proportion of our farmers do not take a newspaper. A well conducted newspaper will do more towards enlightening the reader, than the cost of subscription expended in any other way. Every man and woman who cultivates the soil, should take at least two newspapers; one a standard agricultural paper. Farmers now-a-days, have abundance of leisure time and owe it to themselves, to make more of an effort to improve their minds, extend their knowledge, and keep up with the improvements of the age. In many sections of our State, organizations have been formed, under the title of farmers' club, and horticultural society. These have for their object, the discussion of questions pertaining to agriculture, which is to be commended. But why not include questions of sanitation? It has more to do with the happiness and prosperity of the farmer and his family than the foot-rot in sheep, or cholera among chickens, the proper mode of cultivating fruits and flowers. They never think of discussing matters pertaining to health, but have an idea that for every ailment there is an antidote that can be bought at the drug store for a dollar a bottle. Eighty millions is expended annually in the United States for quack nostrums, the larger portion of which, ac-

ording to the statement of druggists, comes out of the pockets of the farmer. Were they better informed, they would be less subject to this imposition.

In Europe and America, we note the growth of societies of thoughtful, earnest men, organized to discuss questions affecting the public health, and to devise ways and means of making unthinking and unthankful communities healthier and happier. Progress in civilization has given us hospitals for the sick, built asylums for the insane, infirmaries for the pauper, organized and carried out great schemes for the relief of the suffering and those in want. Society recognizes its duty, and honestly, though perhaps not always wisely, seeks to perform it. Public sanitary work is a part of this scheme, one of the parts of practical christianity, and the sanitarian who seeks to extend the knowledge and promote the intelligent study of nature's laws, renders important service in the cause of human progress.

Discussion :—Dr. McCurdy took issue with the statement in the paper that wives of farmers were much more liable to insanity than women in cities. It was true farmers and their wives were in excess in asylums, but not in a corresponding ratio to their proportion of the whole population. In accordance with this they should be as fifteen to one, while, in fact, they were nothing like this.

Dr. Slusser replied that reports of all asylums show farmers and their wives to largely preponderate; vital statistics were too imperfect to settle the question beyond a doubt. He attributed their insanity as largely due to overwork and exposure, with little or no recreation.

Dr. Harmon stated that farmer's homes were made unhealthy by slops being thrown out of the kitchen door. This would be done year after year, and some bad cases of diphtheria he had attributed to this.

SECOND SESSION.

WEDNESDAY, March 30—7 P. M.

Dr. Beckwith read the first paper of the evening session, as follows :

ADULTERATION OF FOOD AND DRINKS.

BY D. H. BECKWITH, M.D.,

Member State Board of Board, Cleveland, Ohio.

Ladies and Gentlemen : Within a radius of a few miles from this hall is gathered a thrifty, industrious and wide-awake people. To your native born have been added representatives of nearly all the nations of the civilized world, swept into your midst by the tide of emigration, and contributing to your prosperity through the exercise of wise and beneficent laws. The buoyancy of youth, the vigor of manhood, and the content of old age all mark an era of improvement unfettered by the traditional prejudices of an older and less heterogeneous people. You have made your homes the abode of comfort, ease and elegance; you have invoked the genius of modern sanitation in the construction of a most improved system of drainage and sewerage and

in bringing to your doors in a few months the waters of the Mahoning river. Round about you lies a beautiful and fertile country to purify the air you breathe and contribute the fruits of the earth to your tables. The most casual observer cannot fail to note these evidences of your prosperity and happiness, and to predict for your beautiful city a rank in salubrity and healthfulness, second to none.

Yet, while advertng to all these evidences of prosperity; while admiring the business energy, active enterprise and placid contentment of your good people, and bestowing unstinted praise upon the public spirit which has prompted the test of modern improvement, it is meet to utter a word of warning against an insidious foe who lurks beneath this placid surface, and whose stealthy footsteps enter alike the abodes of all. A foe born of advarice, and reared in sin, the greatest foe of modern civilization whose existence is virtually ignored, while his name is a household word, and his victims legion. This foe is food adulteration.

The very stealth which characterizes this monster renders his presence among us more alarming. Who would not prefer the fate of Socrates, who found a haven from persecution in the deadly draught of hemlock, to the living death of Theodosius, who contracted a terrible disease from eating noxious food given to him by malicious enemies. A fact authenticated by a curious relic of antiquity, a volume published in 1658 by the Roman Catholic church, from manuscript written A.D., 787.

The certainty of detection of virulent poisons, which the science of toxicology and the practice of jurisprudence has made inevitable, and the stringency of the criminal code in affixing the severest penalties upon infractions of statutes relating to their administration, have rendered their intentional use comparatively rare. But no protection to society against the use of that very large class of substances which are used as sophistications in our food products by unscrupulous dealers, is here afforded, although, in the light of the vast array of facts respecting them, which has been collated during the present century, their presence cannot be other than pernicious in a high degree. The restricted definition of the term poison to a class of substances which produce immediate serious results, as commonly accepted to the exclusion of a far larger class, the poisonous properties of which cannot be disputed, invites the indiscriminate use of the latter wherever, among men, the love of gain becomes the ruling passion. The use of alum, for instance, in bread making, and its addition to fermenting flower to prevent further deterioration, is a common practice in this country and in Europe. We will admit that no symptoms of poison are apparent from a single small dose of alum, but it is a well-known fact among medical men and scientists that in large doses, it acts as an irritant poison, and that it has in numerous well authenticated cases, produced death. The use of chloride of tin as a bleaching agent for low-grade syrups affords another example of a common practice. We may admit again that this salt produces no outward sign of poisoning except when taken in large doses, but what may be said of the cumulative effects of these two substances from the frequent and constant use of the two most universal articles of diet in existence. From a medico-legal point of view it matters little whether death ensues from the direct effect of a small dose of arsenic, or from the cumulative effect of small doses of alum, while from a philosophical stand point the former is greatly to be preferred.

While history affords us numerous instances of the adulteration of food, it remained for this enterprising age and generation to raise the subject to the rank of a

destructive science, and to so adjust the great law of supply and demand in many departments of the domestic economy as to assure a gullible public of certain relief from the vexatious annoyance of fluctuating markets.

In the matter of coffees, teas, spices, syrups, sugars and many other articles in daily use, short crops or sweeping changes in import duties do not trouble the consumer in the least. The beneficent manipulators of these goods take the import, be it much or little, and bring the supply up to the demand in their own warehouses by a judicious use of cheap home products. The thrifty house-wife knows the cost of a box of spice or a package of coffee with the same certainty that the manufacturer reckons the profits on his sales, and both are content. If said sugars are worth seven cents in New York, glucose can be had for three cents in Buffalo, and it becomes a simple example in proportion to lay before the consumer a prime article at six cents, and leave the refiner such a margin for profit as his fancy may dictate. In this instance fraud alone is perpetrated; but the same refiner, to lighten the color of his syrups employs a salt of tin, which is known to be deleterious to health and therefore dangerous to life.

It is only within a few years that this subject has received merited attention in this country. Its agitation among medical men of all schools has stirred up public opinion to demand legislation by which boards of health have been established in the various States, and such means for investigations placed under their control as have exposed the methods resorted to by manufacturers and others in the sophistication of their wares, and in some States, laws have been enacted making the practice amendable to the criminal code.

As early as 1848 the attention of Congress was directed to the wholesale adulterations of imported drugs, and a law was passed under which inspectors were appointed for the various ports of entry, and articles in that line were subjected to a close inspection.

A great reform followed the discovery of a shameful practice of adulteration. Dr. Bailey, the inspector at New York City, rejected no less than 90,000 pounds of the common drugs in use, within a period of ten months, 19,989 pounds of one article alone falling under this condemnation.

The stringency of the laws against adulteration in Europe, and the fact that so little attention has been given to it in this country, enabled foreign houses to carry on the traffic with our people, after it had been forbidden at home. At this time the laws in France had been made extremely stringent. In the city of Paris a public laboratory was fitted up at police headquarters, where anyone having a suspicion that spurious or adulterated food or drink had been sold him, could ask and procure, free of charge, a chemical analysis of the suspected article. A register of all trades people in the city was kept at police headquarters, and conviction under the adulteration act was followed by fine, imprisonment, loss of citizenship or license, and disgrace from the public announcement on a card in the shop window:

“CONVICTED OF ADULTERATION.”

In Great Britain the laws on this subject were quite as severe. Public analytical chemists were appointed in each city or district, whose business it was to make examinations of specimens of food procured by a corps of sanitary policemen, who

were empowered to take possession of any articles exposed for sale which were suspected of being impure or unwholesome.

Conviction under the laws was followed by fine, imprisonment, etc.

As a matter of course the enforcement of the laws against adulteration was attended with much difficulty, especially in England, experts differed widely in their testimony, lawyers squabbled over differences between adulteration, contaminations and substitution, magistrates were not unmindful of the patronage of a class of people who were constantly before them in civil actions, and who were paying clients in their petty squabbles. The laws were subsequently amended so as to cover disputed points and as now framed they present few assailable points. In this country traffic in any substance which may be proven deleterious to health is made unlawful, so the interpretation of the law adulteration has been widened to embrace all wares in any way harmful to general health.

In this light let us briefly review a few of the many dangers to which society is exposed in the provision of the necessities of life. One of the most important frauds which enters into daily use is milk; seven-eighths of our children are more or less supplied, supported, and nourished by milk alone, and it is the only natural product which furnishes adequate nourishment.

Milk is a slightly alkaline watery fluid, containing,

1 part proteid in solution.

2 parts fatty matter finely divided to form emulsion.

3 parts sugar in solution.

4 parts mineral salts.

In these proportions milk makes a most perfect food, not only for children but for invalids and the convalescent, when the constitution does not reject it. The most common adulteration of milk is water, with the addition of chalk, glucose and boracic acid to bring it up to the proper specific gravity. That this adulteration is very commonly practiced has been established in every city where examination has been made.

I was informed, but a short time since, by a clerk in a wholesale drug house, that dairymen were in the habit of purchasing large quantities of glucose from time to time, and as this much abused article is manufactured solely for purposes of adulteration, we may naturally infer that it found its way into the milk-man's cans. In Twinsburg, a physician informed me a few months since, that in visiting a dairy farm he found a cow covered with sores, and undoubtedly suffering with tuberculosis, whose milk was being shipped to market with that of other cows for consumption. Similar cases are noticed in various parts of the country every day.

Thomas J. Edge, a special government agent in Harrisburgh, Pa., says in his report July 21, 1886: "I am not an alarmist, but if citizens could see the cases of tuberculosis which have come to my notice, they would not allow another session of the Legislature to pass without at least an attempt to restrict its spread.

"We have found whole herds and dairies affected to a greater or less degree with this disease. Milk is used from animals scarcely able to stand. That milk from diseased animals reaches your city market is so evident that it needs no demonstration; that no amount of inspection will detect the presence of this disease, is apparent." This report is not essentially different from those of other agents in other localities. It is only a wonder, in view of all the facts which have been gathered by observation and examination, that any children in large cities ever reach man's estate.

A few years ago I attended a family sick with diphtheria. There was no apparent cause for the appearance of the malady about the premises. Upon inquiring I found that children in other neighboring families were suffering from the same dread disease, and I determined to make investigation. It very soon transpired that all of the affected families were being supplied with milk from the same person, *who sold to no other families in the neighborhood.*

I then drove out to this man's dairy farm and found my worst suspicions more than well grounded. The condition of affairs was simply indescribable. The entire water supply came from a stagnant pond, covered with slime and reeking with filth. Several dead animals were floating in the water, partly decomposed. The stalls where the cows were fed, milked and housed, were filthy in the extreme. No attempt at ventilation had been made, and the food was of the poorest quality. No worse condition of affairs could have been possible at the farm. A kind providence only spared the people whom this man supplied with milk. Mr. E. Henst, of London, in a report in 1831, estimates the number of typhoid epidemics in a single district to have been fifty, of scarlatina fifteen, and of diphtheria seven, with 3,500 victims in the first, 800 in the second, and 500 in the third. This statement was based upon the observation of but one short decade, previous to which time no thought of inspection through the milk supply had been dreamed of.

The importance cannot be over estimated of a most rigid system of inspection of milk, not only for the detection of added adulterations, but for the detection of diseases, and the conditions favorable to their development.

It is a well-known physiological fact that the milk of an animal is affected long before the disease shows itself elsewhere, hence the necessity for absolute cleanliness, and such environing conditions as will insure good health and therefore wholesome milk. The quality and purity in milk in a healthy animal, depends upon food, drink, air, light and care. A superficial examination too often satisfies an inspector that every thing is all right, when a more careful one might reveal something radically wrong.

The feeding of brewer's grains for instance, to cattle, is highly pernicious, as may be easily shown by comparing the milk from cows fed on that stuff with that made from natural, wholesome food. I have no doubt but that tendencies toward the use of intoxicating drink in the man, may be often attributed to the use of milk taken in infancy from cows drunken on brewer's grains.

In my boyhood I was taught that farmers were the only strictly honest people in the world, and grew to manhood in this belief. My first encounter, however, with an old, gray-headed farmer in a horse deal dispelled the illusion. The animal was warranted to me true and sound in every particular. As I rode the beautiful creature home, proud of my purchase, I was informed by the first man I met that he would never limp as he was spavined in both legs. I soon after sold him for a smaller sum than I gave. I made my next purchase of another farmer whom I knew could afford to be honest, as he was the owner of several large farms. This time I secured a horse as free from blemish as a yearling colt, an elegant animal, his wife had driven him six miles that morning, he said, and it was true, but the horse ran away with his wife that morning and dumped her and the buggy down a twenty foot embankment. I presume the old man forgot to tell me that in the discomfiting thought that the good woman escaped. I think if satan had been called up to take the reins over this beast he would have been left. Since then I have believed

that honest old farmers, some of them, were just as tricky and dishonest as doctors or other men.

Only a few days since, Henry Beckman, a gray-headed farmer who lives in Newburgh, Cuyahoga county, was arrested and tried before our police judge, in Cleveland, for selling adulterated milk.

Health officer Ashmun, made an examination of his milk on March 16, 1887, and found it contained thirty-three per cent. more water than the law allowed. Judge Hutchins, in passing sentence upon the old man, said: "City people are at the mercy of such men as these, and public health demands that the laws provided for such cases be rigidly enforced. I am satisfied that this old man has been feeding his cows a good deal of water, in fact more than the law allows, and he must pay the penalty, even if it is his first offense. We must show food adulterators that we are not to be trifled with—\$50 and costs.

The act creating food inspectors, which passed our Legislature a year ago, will, I think, have the effect of apprehending those guilty of fraudulent practices, and a few police judges like our own will check the wholesale adulterations now going on.

It would be impracticable with the limited time before us to go into further details of food adulterations. Their name is legion.

It is safe to assert that there is scarcely an article of diet in daily use that escapes, aside from those which come to us in natural form as in the case of vegetables and fruits. It would be an easy matter to find cider vinegar, for instance, in a good apple country, but in forty tests last year I found none. In every case it proved the manufacturer's article, with an alcoholic basis.

Progression is making prodigious strides, and I am glad to welcome new and useful discoveries so long as they are not perverted to bad uses. I naturally and determinedly protest however, when I sit down at table before a dish of macaroni masquerading in a coat of chrome yellow to disguise the poverty of its make-up. In this case ignorance is bliss, for my neighbor sees eggs in its dress, where I see only yellow paint. The dishonest practice of substituting gelatine for eggs in charlotte-russe and in cream has led to very serious results in some recent cases, with the poisoning of scores at one time. Gelatine is of animal origin, decomposes very quickly when the conditions are favorable, has, as food, very little nourishing power, and is fit only for uses in photography and in the mechanic arts for printing. The sulphate of copper and barium, originally employed in the interest of the arts and devoted to mechanical uses, are now largely used for coloring pickles, fruits and other canned goods, and quite often green coffee. Arsenical preparations, aniline, salicylic acid and many of the most useful discoveries in the sciences are perverted to the wrongful and injurious adulteration of food for the purpose of gain.

The dangers to which we are exposed from the use of diseased or putrified meats are very great. The flesh of diseased animals is liable to become putrified sooner than that of healthy animals; and the recent discovery of parasites in meat, which is but partially decomposed, where, in short putriferous fermentation has but recently set in, points to their presence as the cause of the severe effect of sickness produced from the reception of meat in this particular stage into the stomach.

Dr. Ashmun, the health officer of Cleveland, informed me that during the past year that from fourteen to fifteen cases were poisoned from eating pork that was infected with trichina. In this specimen exhibited before you, are many thousands of minute spiral worms. When mature the male measures about one-eighteenth of an

inch in length, while the female is about twice the length of its male companion. A piece of this meat was placed under the microscope, about the size of a kernel of wheat, and four live minute helminths were brought to view. The female in the specimen was stouter and had a dull, rounded extremity. This specimen was obtained only a few days since, from a packing house in Cleveland, and you perceive that it is red and highly colored, as compared with good, healthy pork. Any time you find pork of this color, pass it by—not trusting your butcher as to its qualities.

In this figure, which is enlarged many thousand times, you see little specks and shuttle-shaped cysts. Each cyst contains a very minute cylindrical worm, coiled up in two or two and one-half spiral turns. Plate No. 1 is enlarged from Heller's and has two and one-half turns, when straightened out is about one-thirtieth of an inch long and one seven-hundredth of an inch in diameter. The larger and longer cyst lies parallel with the fibres of the muscles. The first known of these entozoon in human muscles must have been a little over half a century ago, discovered by Sir James Paget, when a student in Bartholomew Hospital, London, where I heard him lecture only a few years since. This is a strange and peculiar kind of worm. To look at this formation on plate two, you would imagine that the presence of thousands of living beings scattered throughout the muscular system of the human body would produce symptoms which would clearly indicate their presence; but it is not so.

To diagnosis trichinosis is no easy task. The symptoms in connection with the discovery of the parasite itself, in the suspected food, and removing a portion of the muscle of the patient and placing it under a microscope, will reveal the real trouble.

The Chicago Academy of Science, a few years since, examined portions of muscles taken from 1,394 hogs in different packing houses and butcher shops in Chicago. They found trichina in the muscles of twenty-eight hogs. From these examinations and observations they came to the conclusion that in the hogs brought to this city, one in fifty was more or less affected with these parasites now on exhibition before you. From the worst specimen they found in Chicago, a person eating an ordinary meal of pork, (the specimen containing 18,000 to the cubic inch,) would soon become infected with not less than 1,000,000 of young trichina.

To destroy trichina in pork, hot-smoking for a number of hours will kill them; thorough salting meats for several days will also kill them. Cooking all meats in a most thorough manner is the only safe way when there is any suspicion that the meat may be infected. As a rule, in our country, pork is usually well cooked, which explains the comparative immunity from the disease.

But the culminating point is reached in the manufacture of alcoholic and fermented drinks. Here the expert adulterator has full swing in the practice of his nefarious business. Not only are the bonded liquors adulterated and drugged, but whole substitutions are sold for the genuine article. The late Prof. Mapes, of New Jersey, a prominent agriculturist and scientist, once took a sample of brandy to experts in the New York custom house, who pronounced it far superior to any then in bond. He then made known that he had manufactured this brandy in his laboratory, and that it contained none of the ingredients of the genuine, except alcohol.

Receipts for the manufacture of all kinds of alcoholic drinks are a very essential part to the stock in trade of the saloon keepers. Prof. Mapes never revealed his secret, but laboratories have been just as successfully worked by unscrupulous men.

Twenty-five gallons of proof spirit, one ounce pelargonic ether, one-half ounce pear oil, ten drops of oil winter-green in one ounce of alcohol, four ounces acetic ether,

three drops cloves and the desired shade of color by burnt sugar, makes a cheap old rye whiskey, and just as good to get drunk on as a better quality. And a twelve gallon keg of Scotch whiskey can be made as follows: Two gallons of alcohol and three pounds of carified honey in six quarts of rain water, five drops creosote in two ounces acetic acid, and one ounce pelargonic ether in four quarts of old ale, and the balance water.

As a rule native wines can be relied upon as pure; where grapes grow in such abundance that wine can be made for twenty-five cents per gallon, there is no need of adulteration. Imported wines, however, cannot be relied upon. In the bottom of a thirty-two gallon barrel of port wine I found nearly ten pounds of logwood, after the wine had been sold. Wines are often fortified by brandy and pure spirits. Those wines which are easily adulterated, such as muscat, claret, port and sherry are to be avoided.

The most common drink in this country is beer, now largely adulterated. At a time when hops were very high brewers began experimenting with substitutes, and learned that the bitter of the hops could be supplied by strychnine, coculus indicus, ignatia and quassia; pungency—by the use of cayenne pepper; frothing by green vitriol, alum and common salt, and the practice then begun has been kept up to the present time. It is the intention of our State Board of Health Committee on Adulteration to make a thorough examination of all articles of drink exposed for sale in various places, and most interesting developments are looked forward to. A few years ago an enterprising business man opened a large retail grocery store on one of the principal streets of Cleveland. With a most worthy desire to do an honest business, he employed a chemist to examine his goods. The first reports which were brought disgusted him. He found that his coffee was adulterated even in the berry by the addition of peas, chicory, etc., and that the ground article was for the most part rye, chicory and roasted almond shells which had been treated with molasses. He then instituted suit against the wholesale merchant from whom he made his purchase. The defense showed by the original bill that the merchant had been buying goods thirty-three per cent. below the actual market value of the genuine article, and that he was cognizant of doing so. The Court decided that as a merchant he should have known that his purchases were sophistications on this account, and dismissed the case. I doubt if any merchant can to-day successfully conduct a general food supply business and not traffic in adulterated goods, however good his intentions. Competition is too sharp and unscrupulous tradesmen too plentiful to permit anyone however honestly inclined, to inaugurate a reform without a national bank at his back to meet his losses. What we need is a strict enforcement of existing laws, and the enactment of others sufficient to drive at least the harmful adulterations out of the market. If some one of our national legislators should introduce and push a bill to its passage, so framed as to exclude all manner of adulterations deleterious to health and follow up its enforcement, the people of this country would rise up and call him blessed.

When we consider that the welfare, the happiness and the greatest prosperity of a nation depends upon the health and morals of its people, and, that unpalatable and irritating foods are the prime causes of very many diseases that flesh is heir to, the imperativeness of entering the field, lance in hand, against this insatiable foe to good living and good temper, food adulterations, ought to be apparent to everyone of us. So much has been charged and so much proven by those who have given their time

and best scientific knowledge to investigations into the conditions of our food products, that ignorance can no longer be made the excuse for inactivity. The most humble among us may become the strongest in this righteous fight. Play must be given to the impulses which are part of all nations, and not the creature of any condition or profession.

We are too prone to thrust upon the physicians and health officers duties which should be our own.

In this age of progress we cannot go back to old time simplicity, when the mistress of the house was the presiding genius of the kitchen, but we can and should examine closely every article of food that enters our doors, and call the attention of the proper authorities to any case of suspected contamination. Let this be done in all our homes and there would soon grow a strong public sentiment against food adulteration.

I appeal to mothers to protect their offsprings from the ruthless hand of this destroyer.

I appeal to the economist to enter the lists against this despoiler of our homes and depleter of our fortunes. I appeal to humanity to shake off the fetters of the most cruel tyrant and exacting despot the world has ever seen. I appeal to the commercial men all over the country to unite as a band of brothers and discountenance the adulteration of food and drink. I appeal to the Legislature of the great State of Ohio to enact such laws that will enable State and local boards of health to carry out and enforce all means, after mature consideration, they deem necessary for the protection of the public in this direction; to rise above a condition of serfdom, into one of freedom, joy and happiness in the possession of good health from the use of wholesome and uncontaminated food and good sound morals in dealing honestly with all men.

This was followed by a paper entitled:

SEDENTARINESS IN SCHOOLS AND MENTAL OVER-PRESSURE.

BY JAMES BATES, M. D., WARREN, OHIO.

The age is precocious. That which in years ago would have required the brains of an adult to master is now deputed to children. The child is expected to work out problems in the obscure sciences, when the dyaphyses and epiphyses of his bones are yet held together by cartilage. Before the fontanelles are closed we find him instructed, not how to work uprightly, or to exercise in his childish games gracefully, but in studies and literary matter, difficult enough for much maturer years.

Appearances indicate that our instructors and legislators, to say nothing of parents, are heralding the day when the average child will be so advanced that the studies of the adolescent will be mastered by one of half his age. Comparative sciences of both physiology and anatomy teach that animals do not reach the plane of physical usefulness until the bony structure has become hardened throughout. Hence the horse is put to harness when the maturity of four or five years has been reached. The cow is bred and milked at nearly the same age. In fact, all the domestic animals have a certain point, with regard to age, which experience has taught us qualifies them for duty in the particular sphere in which they are required to act. Why, then, should man, whose station is far above the brute creation, who is endowed with intellectual

power, who, in short, because of this intellectual power, which requires many years to mature, form no parallel with the rest of the animal kingdom? Why should he be pressed so hard and urged so vehemently, when the fact is obvious that upon this healthy *body* must depend the intellectual perfection, and only as his *body* is strong, well matured, and self-sustaining, can we expect the *mind* to be healthy? Man, then, is an intellectual being at the expense of his physical forces. The lower the grade of intellect the higher the standard of physical health. The carter, the coal heaver and the athlete are men of magnificent physique; while, on the other hand, the physical condition of the purely mental laborer is sufficiently apparent to any one. In the following pages it will be our endeavor to show the necessity for co-operative forces, so that the mind of the child shall receive from his healthy body the strength commensurate with and in proportion to the work he has to perform, and his body secure that intelligent regard and direction, as well as support, which emanates from a well-balanced mind.

The school-room, with all the modern advantages of architecture and sanitary science, must needs contain many imperfections in the way of ventilation, light, sedentariness, etc.; and we find that want of proper ventilation, insufficient or improperly directed light, lack of exercise and precocity are still ruining, not only the bodies, but, through them, the minds of our school children.

The brain and spinal column, and all the nervous forces depending upon them, are kept in active working condition at the expense of the bodily tissues. It has long been demonstrated that more food is needed to keep up the healthy condition of the nervous system for its appropriate work than for muscular labor alone. But the body must first be sufficiently nourished, for brain food, furnished from appropriated bodily nourishment, cannot be secured unless the tissues of the body are in a healthy condition. Aside from the alimentary canal, the lungs play a very important part, perhaps the most important part, in the animal economy. In the reception of atmospheric air and in the expulsion of carbonic acid gas the lungs play a dual part, which, if retarded on either hand, must lead to serious consequences. * * * In the re-breathing of expired air we find numberless examples in which faintness, nausea and cephalalgia are prominent symptoms, and if persisted in it results in prostration. * * * The air of the school-room must be pure—in the first place, free from dangerous gases; secondly, foreign matter, such as dust, etc.; and thirdly, it should be of proper atmospheric pressure. We have referred to respired air as being loaded with dangerous gases which have a deleterious effect. Unless the child has the required number of cubic feet of *pure* air at each respiration he must needs breathe either the poison from his own or some neighbor's system.

Another channel through which poisonous gases have access to the school-room, is the pernicious habit of having (for the sake of economy in building) the heater furnace in the basement. Noisome gases are particularly prevalent in cellars and, if heated, must necessarily rise to be carried through various communicating openings into the rooms above. Arriving in the school-room, they are added to the already deteriorated air, much enhancing its dangerous tendencies. Cold air is not necessarily pure air, and the cooling of rooms by the introduction of air from disused rooms, either above or underground, must be productive of bad results. Inspired air should be free from dust, infusoria, and other minute enemies. School-rooms, almost of necessity, are dusty, and every movement of the busy feet causes quantities

to float in the atmosphere, to be in turn breathed into the lungs, and there to become adherent to the moist surfaces. By this means catarrhal diseases are generated from mechanical irritation, frequently eventuating in serious results. Mucous discharges from the mouth and nose, frequently loaded with some microscopic enemy, can in this manner be carried from one to another. * * * * *

The atmosphere of the school-room should be of equable temperature, so that too heavy an atmosphere does not enervate the physical forces, or too light interfere with air supply, and in that manner retard circulation.¹ * * * *

Another matter of hygienic deficiency is the manner in which school-rooms are lighted. The importance of good, well directed light, with regard to the welfare of the scholar, cannot be urged too earnestly. The human eye is in more ways than one the "index of the brain." We know that a sudden glare of light will cause temporary blindness from inability of the iris rapidly to correspond with sufficient contraction, and if too intense and long continued, destruction of sight will ensue. The opposite extreme of sudden darkness will also have a temporary blinding effect from too slow response of the iris in expansion, and corresponding admission of light to retina.

Muscular tissue put upon a severe strain will lose its contractile power, and, for the time being, become lax and powerless. Constant straining of both the circular and radiating muscles of the iris, beyond a medium illumination, must result in inability to either contract or expand when required, and the vision will be blurred. Undersized type will have a similar effect; the child when reading, will, if type is too small, try to get the page into as good a light as possible, hoping by increased illumination to better the vision; the light reflected from the white surface, intensifies what is otherwise probably too strong. It does not assist the ability to see, but strains the muscles of the iris and will cause temporary paralysis, or at least, imperfect accommodation. A certain amount of irritation must follow all abnormal conditions, so that from the iris will spread congestions and inflammations affecting in time the optic nerve, thereby making direct communication with the brain. But improper light may cause direct congestion of optic nerve.

*Dr. Wells, in his excellent work, says: "The ophthal moccope often reveals a hyperæmic and congested condition of the optic nerve and retina, especially if the eyes have been overworked by artificial light. The degree of myopia is often greatly increased during childhood, by long continued study, more especially by insufficient illumination, etc., etc."

The child needs sufficient and appropriate exercise. Without muscular movement tissue waste cannot properly take place. Physical health being in proportion as exercise, food, and sleep are in sufficient quantities. The child should have three hours for meals, five hours for study, seven hours for amusement, and nine hours for sleep.

Aside from rest of mind, which the pupil secures by exercise, it needs no argument to prove that every organ of the body is improved by it. Without physical move-

¹A German genius has, within the last few months, discovered a method which, if successful, will revolutionize ventilation, namely, the window-glass is punctured with small holes, so small that over a hundred will occupy a square inch of surface. These holes are larger on the inside than out, and in this manner currents of air are prevented. The hospitals have recently adopted this plan of ventilation.

*Dr. Wells on diseases of the eye, pp. 498 and 499.

ment, food is neither taken in sufficient quantities nor appropriated properly. The lungs do not become inflated in every part; the circulation is not kept up with that thoroughness that rapidly empties and fills the smallest capillaries, and, finally, the effete materials of the system are so imperfectly removed as to be productive of organic changes. The child should not be stinted in regard to food. Remember he must add to his system as well as sustain it. * * * *

"Nature's great restorer, gentle sleep," is of paramount importance to the child. In the oblivion of repose he will recuperate his powers, both mental and physical, and be fitted for the renewed labors of the day. Dormitories should be especially well ventilated, and sufficiently heated to approximate about 70° Fahrenheit. Night air, at least between 9 p. m. and sunrise, should be excluded. That the mind of the child depends on the body for nutriment is just as true as that the limb of the tree depends on the well-rooted trunk for support. The babe is a year or more old before he uses his limbs or speaks. His reasoning powers come much later. Up to four or five years his actions and speech are simply parrot-like—merely imitating his elders. At the latter age he commences to reason and memorize to some extent, vastly proud of his performances; and also, to be fashionable, his parents hurry him into the school. He is quite backward if he does not know the alphabet before five years is reached, and he must read by six or seven at furthest. Having learned to read, studies follow apace, so that cases are not rare where higher mathematics and parallel sciences are in the hands of the twelve-year-old. To master these his time for amusements, meals and sleep must be encroached upon, his body must be depleted of needed stamina, and in his struggle to keep up with the mental requirements of his governors he is fast becoming a physical wreck. In examinations for cadetship in the United States army and navy, out of one hundred applications only from 1 to 5 per cent. will have sufficient physical and mental perfection to pass. Obviously the cause is, that the boy who is physically perfect is "backward" in his studies, and the boy mentally competent has wrecked his physical organization in becoming so. Sedentariness has later evils. When maturity has been reached, if he does not succumb sooner, we find a mind crammed with useless facts and theories attached to a body of not sufficient health to promote that energy and force so necessary to successful brain work. A useless clod in the great field of labor, the only hope for such an one is an early grave. One can almost envy the ancient Romans, who, first versed in the feats of the arena, secured their mental training secondarily. With abbreviated hours of sleep, exercise and meals, is it surprising that sedentariness should be such a serious matter? Precocity must needs produce sedentariness, for the parent or teacher finding a child bright will compel all the advancement possible, regardless of results.

The remedies have been repeatedly referred to in an indirect way in the preceding pages; hence a recapitulation will suffice. Everything that will conduce to health of body is of primary importance, always remembering that *full mental development can only be secured through long life, and length of days will only accompany perfect health of body.* Hence ventilation that will secure pure air for inspiration; reflected light which will secure medium illumination and furnished only by the sun; abundance of exercise, so as to call into play every organ of the body, and *absence of haste* in acquirement of knowledge, are means that if intelligently followed will greatly enhance the sanity of our schools, and be productive of healthier men and women to fill our places in future generations.

Discussion.—Dr. McCurdy expressed himself unfavorable to present educational methods.

Children should not enter school before the age of ten or eleven years. When in school they should not be obliged to sit still; it was a great injury to their growth to do so.

Dr. Beckwith commended the paper. It was impossible to properly educate children by will of thumb; they differ as men and women do, and delicate ones should not be crowded to keep up with the more robust.

Dr. Palmer thought badly constructed seats of great injury to school children; "the seat should be made to fit the child, not the child to fit the seat."

Dr. Miller remarked it would be difficult to fit every child with a seat. General principles could be followed in making the seats so they would fit quite as well as ready-made shoes.

Prof. Moulton, of Warren, said some had remarked you shouldn't keep a child still. Any teacher would know you *couldn't* do so if you tried. As to age, Dr. Brown-Sequard had once remarked to him he thought a child's mind should be trained young, this being necessary to its health.

The next paper was read by Mr. Hartzell, as follows:

DISPOSAL OF DANGEROUS WASTE PRODUCTS.

BY JOSIAH HARTZELL, ESQ., OF CANTON.

The deposit and storage of organic waste matters in the ground in the near proximity to dwellings in sufficient quantity and for a sufficient time to admit of their fermentation or putrefaction is a practice which calls for the united and earnest protest of all right-thinking men. It becomes an ever-present danger to health and to life. In short, it is an evil needing correction.

It is a popular illusion that removal and disposal of human wastes are questions properly appertaining to towns and cities only. Statisticians have proven the fallacy of this idea. Epidemics of filth diseases rage in the country as they do in the city. A larger proportion die of enteric fever in country and village than in the sewered city. In periods of protracted drouth, when the water in the well falls low, draining a proportionately larger area of the surface, reaching often and often to the cesspool itself, how sad becomes the spectacle presented in many and many a farm house! Men in the prime of life nearly always, and needing and drinking water in the largest quantities, sicken and die. The withdrawal of divine favor, inscrutable providence, these and such like consolatory reflections, barren of both reason and true consolation, and for the most part barren of truth itself, are the best than can be offered to the stricken family. The barn stood above the well site and drained into it. The cesspool drained into it. If the man died of typhoid fever, or other zymotic disease, he was poisoned; he was killed. Every reader and observer of more recent developments knows the truth of what I have said—knows that a day would not suffice to read the proofs of the most convincing character, verified by eminent doctors and specialists.

Sanitary effort has for its mission the abolition of this great abomination. It says: Let the shock ripen well for the grim harvest; let there be an end to premature deaths from preventable diseases; let there be no more broken columns in the churchyards. Viewed in this light, my topic, noisome as it may appear, has that in it which reaches out to every one, and craves a sympathizing heart and a helping hand in our grand and holy crusade for cleanliness. State boards of health are created to spread needful information, to investigate, to aid our law makers in formulating proper laws, and to enforce obedience to the laws passed. But Lord Derby declared long ago that "no sanitary improvement worth the name will be effective, whatever laws you pass, or whatever powers you confer on public officers, unless you can create an intelligent interest in the matter among the people at large."

Heretofore, and now; those who have manifested an interest in this subject are limited, as a class, to the medical profession. Glance at the programme of this Convention. Letters in the nature of replies to queries involving this class of subjects generally address me as "Doctor." Willingly, or unwillingly, the medical profession must not only charge itself with the healing of the sick—for which it is paid in cash—but also with all efforts for the prevention of sickness, for which services it must open an account in that bank where moth and rust cannot corrupt, and where thieves do not break through and steal. And yet this bank, in which doctors are about the only depositors, deserves and earnestly solicits the patronage of the general public.

But the advance of this science, and its popularization even, must not be suffered to lag through fear of vulgar derision or the squeamishness of prudes.

Now if, as the old maxim says, "public health is public wealth," if the health and lives of industrious citizens are the most priceless possessions of the republic, how important it is that we should enlist the co-operation of the farmers, from whose industry all the nation's wealth is primarily derived. The farmer leads an individual existence, removed from the habitations of other men and from the quick help of the physician. Preventive medicine has a strong claim to his attention.

How happily situated is the farmer in his relations to the conditions of a healthy life! The three things essential to his maintenance—pure air, pure water, unadulterated food—may be his in abundance. None can encroach or interfere—he is master of the situation. He may even, to a greater extent than urban residents, scatter the waste products of his household economy upon the soil about him. Vegetation will at once seize upon them, and after having served its purpose with them, give them back to him reconverted into wholesome food. But there are certain limits, certain rules, which even our independent ruralist must need, or a penalty will be exacted from him, and it will not be a light one. For, in this matter of cleanliness, when Dame Nature is once affronted, her frown is terrible.

Every person who has visited the Rocky Mountain region will recall the large proportion of persons who are unwillingly detained there by reason of impaired health. The dry atmosphere is indispensable to their continued existence. Had these persons and their progenitors taken such precautions as they might have done to guard against the effects of *ground moisture*, they would have been spared from many sufferings. Had their houses occupied a site of such dryness that the moisture from ground water could not make itself felt in their cellars, there would probably have been no disease. Those who would have the proofs of the effects of moist sites and cellars

upon health should read the reports, which are abundant, and not of doubtful import.

The class of diseases most frequently occurring in connection with water-logged ground and damp cellars are consumption, bronchitis, pneumonia, chronic rheumatism and chronic dyspepsia. Statistics all over the world show that these diseases claim as many victims from wet dwelling sites as from any other cause; also that people in the country districts are peculiarly liable to them. It is an established fact that the rate of mortality from lung diseases increases exactly in proportion as wetness prevails.

But you will say wetness is not filth. True, but moisture derives from filth its power for harm. True it is that men live to a good old age upon the sea, but they have about them no barn, pig-stye, cesspool or sink-hole to leech their products into the soil and give back the same into the moistened atmosphere in the shape of infections and sickening exhalations. It is not required in this connection to say that it was this or that parasite which produced the disease. I only state the unimpeachable fact that in all animal and vegetable decay above ground, and especially underground in the presence of moisture, there are multitudes of living organisms. "These germs are analogous to others which experiments have shown to be capable of nourishment, growth, and self-multiplication; they are infinitely small, light, capable of being lifted by the slightest current of air; in fact, their habitat is watery vapor. In pure, dry air they perish, or are, at most, inert. In humid air, especially if charged with putrefied animal matter, they live, multiply, and acquire the full vigor of their nature. If now they are deposited in a proper nidus they reproduce themselves by myriads." In too many cases this "proper nidus" has been the respiratory and digestive organs of men.

The avoidance of these evils, especially by farmers, is nearly always possible. Select a site naturally dry for the house. If it is impossible to have a site naturally dry, underdrain to such a depth below the bottom of the cellar that the latter will remain dry. Floor the cellar over with an impervious cement. Make sure that the drainage from barns and pig-pens cannot reach the well or the house. Abolish the cesspool and sink-hole. Never, under any circumstances, allow excreta, or organic wastes of any kind, to be stored in holes to putrefy about or near the house, well, cistern or spring.

I am well acquainted with farmers who manage the matter as follows: They have made of two-inch oak plank a water-tight box, say six feet long, two feet wide, and one foot deep. In one end is a stout iron ring. This box is placed under the privy seat. Inside the privy there is room for a bin, in which is kept a supply of fine, dry earth. The contents of the box are deodorized, and there is no nuisance. As often as it becomes necessary a horse is made fast to the iron ring, the box is dragged to a thin spot in the fields and upset. The chemistry of nature charges itself with the rest, and there is no doubt that all the trouble is most amply repaid by added fertility to the soil, to say nothing of the far greater recompense in the way of cleanliness about the house. This illustration is given, not because it is the farmer's best plan for disposing of excreta, but to show how easily this filthy bugbear, and disease producer as well, can be well disposed of. Where there is a will there will be a way. The hardest part is to get the will all right. Let the proper convictions once be formed, and the stifling horror of the average country privy will become extinct. The

cellar will be watched. The ground and the drinking water will be jealously guarded from contamination, and filth diseases, and the premature deaths resulting therefrom, will remain only as the chastisement of extreme stupidity, laziness and ignorance.

All that has been said regarding the danger to health from moisture and putrescible filth in the ground under and near farm houses, applies naturally, with equal force, to dwellings in village and city. The villager's situation is, in certain respects, the most unfortunate. Villages are very liable to epidemics of preventable diseases, such as scarlatina, diphtheria, and enteric fevers. The village can have neither the sewers of the city, nor the isolation of the country. And yet all reasonable safeguards may be taken as well as in the city, and at greatly reduced cost. The Chinese cities, big and little, have no sewers. All the filth, including fecal matters, are thrown into the streets. Yet Chinese cities, curious as it may appear, are said to be almost free from filth diseases. Why? Simply because all the filth is quickly taken beyond the city limits and used as manure. That is all the secret there is in the whole problem. Leave nothing to undergo fermentation or putrefaction. Fresh excrement is malodorous, but not dangerous. "It is the barking dog, not likely to bite." The gas of putrefaction from the cesspool is the bite of a dog that gives no warning bark. Putrefaction of filth in closed vaults, where its products reach not only the air, but the ground, and possibly the water level, is the real enemy. The privy cesspool has been called a relic of barbarism. Dr. Wight tersely says, "wherever it is found there is barbarism. Moses and the cat have taught mankind better than to maintain such a Hindoo temple of filth. The villager usually has a good sized lot and garden. He can buy an empty oil barrel, saw it in two in the middle and make two tubs which will not leak. Place the two on top of the ground under the holes in the privy seat. Keep the contents of the tubs dry with dry earth or ashes. The contents of the tubs will evolve no gas, will not undergo putrefaction, will not maintain disease germs as long as such contents are kept perfectly dry. When the tubs are full, pull them out and spade their contents into the garden."

The good bacteria live in the topmost eighteen inches of soil. These will transform the filth into grass, and flowers, and fruit—blessings instead of curses. If the villager will only take heed to the gospel cleanliness, he can secure immunity from the dangers of filth diseases, *if* his neighbor will do likewise. But after he has taken some such simple precautions as have been described, it will avail him little if his neighbor's cesspool is permitted to continue its deadly work. But individual effort can go no further; he must have the help of organized effort, of municipal regulations, of board of health, or its equivalent, clothed with sufficient authority to clean the village and keep it clean.

In making our inventory of the adjuncts which have a greater or less bearing upon the public health, the barns and stables cannot be omitted. I have already alluded to the farm barn, and shown that a prime factor to be considered in its location is that gravity shall always carry the fermentable wastes emanating from that source away from, and never towards, the house and water supply. Stable floors should be of asphaltum or concrete. Clay well packed down, and occasionally to be renewed, has also been recommended. Plank floors that are water tight are admissible; but leaky plank floors are about the worst that can be imagined. Through such floors pass nearly all the urine, the animal product which is richest in fertilizing salts and in putrescible matter. The dark, pent-up space below them furnishes the very best con-

ditions for the production of gases which are nothing but hurtful to man and beast when mixed with air, though of great value when absorbed by land. It is not unusual to see men pass back and forth, day after day, and year after year, in stables where, when the heat is sufficient, the fumes of ammonia will rise up so abundantly as to be almost blinding. If these gases were a little less diluted with air, and should be inhaled a little more continuously, disease would declare itself at once; and that it frequently does so is not doubtful. Horses suffer largely from imprisonment in such an atmosphere. In stableless regions horse ailments are almost unknown. Have you ever seen the abomination of a dug well right under such a floor, the water of which was used for drinking purposes? There was such a well in the tavern stable in the village near which I passed my boyhood. This water was used in the house, which was a stage station, and had a good repute. I remember the landlord's three sons, just entering manhood, as among the very finest physical specimens I have ever seen. They were exceptional for their sobriety and industry, a thing that was naturally emphasized by their father's vocation. One dry fall, all three of these young men died of typhoid fever. The sun of science, which to-day shines for all, leaves no shadow of doubt resting upon the cause of that most shocking sacrifice to ignorance of the laws of healthy living.

The rule for disposal of barn wastes is safe, easy and profitable to abide by. Have no dark, inaccessible places to store or admit decaying wastes into. Store all the liquids and solid manure under cover, and haul to the field frequently, and always before fermentation has set in. By so doing the health of the man and of his stock, and of his land will be cared for in the best possible way, by one and the same operation.

The toughest riddle with which that branch of experimental knowledge which is called sanitary science, for convenience, has yet had to grapple is the disposal of the sewage outflow of inland cities. The civil engineer will easily arrange a system for the collection of the city's wastes; also, perhaps, some plan for their disposal; but if he has kept himself abreast with the best thought and experiment of our day; if he be, in short, worthy the title of sanitary engineer, the last part of the undertaking above-named will almost assuredly give him pause. The nearly universal acceptance of the germ theory of communicable diseases; the fast growing opposition to the pollution of streams by sewage; the legislation in which these objections are fast taking shape; the difficulties in the way of safe and successful precipitation; the still greater difficulties to be confronted and mastered by filtration and irrigation methods; the financial obstacles to be encountered; some or all of these, and others not yet named, are liable to rise up before him. He who solves this problem in such a manner that the city's present and future inhabitants shall have no cause of complaint in health, cost, or convenience, and so that no riparian or suburban interests suffer harm, should possess a full knowledge of all the phases of all the principal experiments that have been made in this field the world over. With all this knowledge at his command, it is not unlikely that he will be ready to admit that the solution of the problem of the best disposal to be made of the sewage of cities is, if not in its infancy, at best in a stage leaving very much to be desired.

But the city must have sewers. Think of the ancient cities that are blotted out; of Nineveh, and Ephesus, and Antioch, and of the many names these suggest; also of Rome with her Cloaca Maxima; perhaps it was her big sewer, performing its duty

from Numa Pompilius to Humbert, that has made her the "Eternal City." And how slow has been the growth of more modern cities before, and how rapid since, the introduction of drainage systems, of sewers, the only weapons with which the appalling march of filth epidemics has ever been successfully combatted. And how changed for the better in death-rate, health, comfort and prosperity are the populations enjoying the convenience and protection of a good sewer system. Recognizing these facts, a good many cities in Ohio are just now canvassing this important subject, and for the most part none to soon.

Such a city in Ohio of, say 20,000 inhabitants, will have occupied its site the best part of 100 years. In its thickly settled parts holes will have been dug for the reception and storage of kitchen and excrementious wastes in thousands of places. Dug, filled and redug; for it is cheaper to dig a new hole than to empty the old one. Could every vestige of building improvement be swept away from one of these unsewered city sites, leaving only the holes, what a spectacle would be presented! Could any sane man be induced to go and live in the midst of such uncharacterizable surroundings? And yet it is a fact that the sanitary condition of all these cess-pools would be improved by being uncovered to the sun, for both darkness and confinement of such substances greatly augment their mischief-producing capacity. Then there is the effect of all this upon the water supply to be considered. The city may or may not have water works. Certain it is that many men will, for one cause or another, adhere to the wells, never giving a thought to the thousands of pockets hanging full of foulest filth right over the water-seam, slowly leaching their fluid parts down into it, and very often actually penetrating directly into it. Present the case as you will, these people will go right on sounding the praises of the clear, cool water from the sewage-contaminated well over that derived from the filtering cistern and stream. It is things like these that strike our best workers right between the eyes. The chemist and engineer may solve the hardest problem in nature, but the problem of human stupidity can bid them defiance. In a city of 20,000 that I know of, a few years since, the question of sewerage the city was, by a lot of cowardly politicians, submitted to a popular vote. The enterprise was crushed by six hundred majority. A successful epidemic is the only eye-opener that can pierce these barriers of prejudice and wilful ignorance; but the true philanthropist can not, and ought not to wait for such a catastrophe, which overwhelms alike the innocent and the guilty. I must not dwell further upon the existing need for some form of disposal other than storage in a cess-pool on the premises.

A few cities in Europe, the most conspicuous example being Manchester, England, a city of 250,000 inhabitants, use the tub and pail system of disposal; 40,000 pails are used. All house wastes are hauled beyond the city limits several times each week. In the employment of this system the regulations are exceedingly arbitrary, leaving very few details to personal choice. The general nature of this plan is such that it would not be tolerated in any city in America.

There are, however, modifications of this general plan in operation which have much to recommend them. In a paper read before the Ohio State Sanitary Association at Columbus, on February 11th, Dr. John McCurdy, of Youngstown, described a method of disposal, used to some extent in that city, which, from the sanitarian's stand-point, has many excellent features. The privy is placed high and dry, the air having access to all parts beneath the floor. A water-tight box is placed under the

floor, large enough to receive all the excreta, and projecting one foot beyond the back of the structure, the top of the projecting part being covered by a removable lid. This gives admission for the removal of the contents. Dr. McCurdy says that contractors remove the contents as often as needed, without any attention from the owner, at the rate of \$4 per annum. The regular application of the ashes from an average house is all that is needed to keep the mass dry, odorless, and in a state to be removed without offense. But lime, or copperas can be applied if required. Where water carriage is not used, this mode of disposal would answer an excellent purpose; but, its adoption should be made uniform by health authorities having the necessary legal equipments.

The cities in Holland, where the low and level lands render removal by gravity impossible, employ the Liernur system, which provides for the forcing of the sewage from the city to the fields through iron pipes by suction. The sewage is used as manure. The Shone system is used to a limited extent. It accomplishes the same purpose, and by the same means, except that a plenum, or compressed air, is used to force the sewage through the iron pipes.

What may be regarded as a curiosity in this field is a recent practice adopted in certain school houses. The privy seats, for each sex, respectively, are all in a row in the basement of the building. Under each of these rows of seats all is open from end to end. The building is heated with hot air, and has a high ventilating shaft. Warm air, having served its purpose in the school rooms, is drawn into the ventilating shaft, passing, on its way, through the space under the two rows of seats. The excreta, yielding up all moisture to this current of warm air, are reduced to a dry, insignificant bulk, which is shoveled into the furnaces and burned. This method has been introduced into the costly new school building recently erected in Canton, but not yet tested. Its merits cannot, therefore, be properly characterized; though much is claimed for it in the way of testimonials, a kind of evidence which is very apt to be devoid of scientific authority.

The method in more common usage in Europe, and the one universally employed in this country, is the water-carriage system. Sewers using water-carriage were formerly made so as to receive in addition to house wastes, all superfluous surface drainage, including rain water. This is the combined system. The very much greater capacity of this class of sewers necessitated by the admission of storm water, entailed a formidable augmentation of first cost, and, as the figures show, of annual repair bills. The storm water, also, constitutes a most unruly factor when other than crude disposal is attempted. Both these difficulties, and others, have been obviated by the separate system, consisting of conduits of much smaller diameter, being intended to receive only house and manufacturing drainage and waste matters, thus leaving the removal of storm water to be provided for by other means, or to flow away over the surface, where that is possible.

We will now suppose that the engineer has brought the sewage of the city to the outfall of the main sewer; the question of disposal must now be decided.

Cities situated on the seaboard may dispose of their sewage in the crude state by pouring the outflow of their sewers into the sea. Great rivers, like the Mississippi, are, it is claimed, capable of diluting, oxydizing, and, so to speak, annihilating the drainage from large cities without appreciable danger to riparian interests.

With inland cities the conditions are quite different. With no sea, lake or large river

to receive the sewage, its discharge must necessarily be made into the smaller streams or upon the surface of the ground. A number of cities in our State have availed themselves of small streams for this purpose; but the policy of such a disposal is more than questionable. While average streams have a volume of water during wet seasons of the year that assures the addition of sewage against becoming a nuisance, during the dry months the shrinkage in volume and the lazy flow of such streams is liable, with the addition of the sewage of the city, to bring about a state of things which is actually, as well as legally, a nuisance. Under these circumstances the authorities and the courts come to the assistance of those whose interests have suffered harm by the proceedings, and other methods of disposal have to be sought and employed.

Twenty-five years ago all, or nearly all, the rivers in the British islands are said to have been foul with the sewage of cities. The courts were full of proceedings in injunction. The subject was taken up in Parliament. A "Rivers' Pollution Commission" was formed, which has absolute control of all cases of this kind. Now the rivers of England have been restored to something like their ancient purity. The sewage of the cities has been disposed of in many curious and interesting ways, and the death rate has been reduced from 30 to 20 per living thousand per year. There is the highest probability that the experience of England in respect to the pollution of streams by sewage will, to some extent, be repeated in our own country.

One word here as to State legislation in regard to sewage disposal and the protection of streams from pollution. The State of Massachusetts has already provided quite fully for the exigencies liable to arise in this field. For twelve years or more that State has carried out, through its Board of Health, extensive inquiries on topics relating to sewage disposal and water supplies as affecting public health. But the most decided step in advance was made by the Legislature of that commonwealth in 1886, which enacted a law "to protect the purity of inland waters." By authority of this law the State Board of Health has a general supervision of the water supplies and sewer systems in the State. The Board must confer with municipal authorities in regard to these subjects, and all corporations and manufacturing enterprises liable to contaminate inland waters must submit plans to the Board which involve the proposed disposal of sewage and wastes. The law provides for the appointment of the proper officials, and for the enforcement of their decisions. The last report of the Board indicates that this work has been entered upon with a degree of thoroughness that is most commendable and encouraging to the cause of public health in this country.

Sanitation is no longer an occult science. Very many of its lessons have the most important bearing upon the health and happiness of the people. It is high time that many of these lessons were enacted into law, in Ohio as well as in Massachusetts.

In a number of cities in England the Rivers' Pollution Commission allows the water flowing out of the sewers to pass into the streams; but only after the same has been deprived of its most objectionable and solid matters. The sewage flows into and through a series of tanks. Chemicals are added which cause matters in suspension to sink to the bottom. The partially purified water above is then drawn off and admitted to the stream at once, or after it has passed through filtering beds of some proper material. The sludge at the bottom of the tanks is, by means of presses, deprived of most of its water, and pressed into cakes that can be handled without

danger or offense. This residuum is then appropriated for manure, with more or less expectation of some pecuniary return. Experience, in this respect, has shown that it is not safe to expect more than that farmers will come and haul this residuum away, provided they can get it in a shape to be handled free of cost. This plan of disposal is known as the precipitation system.

The subject of sewers has engaged attention in Canton during several years, but thus far with little practical result. A system, modeled on the separate plan, was adopted in 18 3. The only stream available for disposal is the Nimisilla creek, which has a minimum flow of about 7,000 gallons per minute, and is interrupted in its course by numerous dams. The authorities of the city, feeling that they were not warranted in pouring the sewage outflow of the city into this stream in its crude state, sought the advice of Samuel M. Gray, civil engineer, of Providence, R. I. Mr. Gray came to Canton and made a personal inspection of the drainage topography in January last, and only recently has furnished his report, in which, after a brief review of the data affecting the situation, he names three plans by which the sewage can be treated. He also gives estimates of the cost of disposal by farm irrigation, by intermittent filtration, and by precipitation, respectively. He concludes his report by recommending the chemical precipitation method for Canton.

Another method, which has just been alluded to and which has during fifteen years, been practiced to some extent in England, is called intermittent filtration. This consists in grading the surface of the land into level, hollow beds, and underdraining very thoroughly to the depth of six or seven feet. The sewage is poured upon these beds intermittently, giving to the beds frequent periods of rest, during which the land is thoroughly drained and aerated, and its original absorptive power restored. The return to be obtained from land thus treated in the way of crops has not been found to be an item of any consequence—though some return has been obtained from rye grass, a green forage crop, which is capable of thriving even in the presence of a great abundance of sewage-laden water. Experience has shown that one acre of land prepared in this way is capable of purifying the sewage of about one thousand persons, or from forty thousand to fifty thousand gallons per day.

With a view to getting a return from the crops, a farm dedicated to sewage disposal should consist, in its area, of one acre to every one hundred inhabitants. A soil capable of the greatest absorption, sandy, gravelly, loamy, is the best. The effluent water is to be provided for by underdraining. The drain tile, of the requisite capacity, should be placed at a depth of five or six feet, and the drains should be not more than ten feet apart. The effluent water is sometimes pure and clear, so that fish will live and remain healthy up to the outfall of the drains.

If care is taken there will be no nuisance. Carelessness or stupidity will insure a nuisance, and a partial, if not total failure.

Immediately after the soil has absorbed its full, it must have a period of rest, longer or shorter, in proportion to the texture of the soil and the efficiency of the underdrains. If the soil and other conditions are favorable, the sun, and the rain, and the oxygen, and the microscopic organisms, and the plant roots, will soon transform the foul wastes of the city into luxuriant fields and bountiful crops; but if the soil is impervious, and the drains slow to act, a longer period is required.

The crops to be raised should consist of the vegetables and grasses best adapted to the soil, having an eye to the varieties which are most greedy of moisture, and of

quick growth. A careful regard is also to be had to the requirements of the market in which the crop is to be sold. The crops in highest favor have been rye grass, celery, sugar beets, tobacco, cabbage, hemp, and the other vegetables requiring much moisture.

Now it would be safe to say that if a city is unable to dispose of its sewage crude; that is into the sea, or a very large river; and if a farm of the proper size could be obtained at a fair valuation; and if the sewage would pass from the city to the farm with the aid of gravity alone; under such conditions, I say that the proper course to be pursued would be eliminated from doubt. But the presence of all these favoring conditions is rare, and besides, there are other and quite as serious "ifs," that cannot be safely disregarded by the municipality that undertakes sewage farming.

When the subject of sewers and sewage disposal comes to be agitated in the average town or city, one of the first and most striking phenomena that are quite sure to be developed, is the vast amount of sanitary and engineering knowledge that has been lying about in a latent condition, only awaiting the kindling scratch of inquiry to awaken it into electric effulgence. There is a furbishing up of subterranean lore, reaching from the old Cloaca to the costly and nearly useless (for sewer purposes) cut-stone tunnels made by Napoleon III. Nine out of ten feel sure that the main drain should be at least six feet in diameter where it empties into the nearest stream. For, notwithstanding the large development of this subject, and the many other methods employed in other lands, there is in our own country only a single exception of consequence to this practice of crude disposal into streams, which is in the case of Pullman, Illinois. It is, therefore, little to be wondered at if sewers with a big bore and an out-fall into the creek, come up as first impressions in the way of requisites for a sewer system.

But then there will probably be, among the rest, some who have observed more carefully, and have examined the subject more thoughtfully. They will have heard of sewage farming, of irrigation, and of the various other systems, and they have decided that of all the systems the sewage farm is the ideal system. It strains the water of all that is offensive, and gives it back into the stream in a state of purity. It converts putrifying wastes into manure, and ultimately into cash. It is the ideal system.

Well, we agree with our theorist—it is the ideal system; but, as I have already intimated, there may be contingent dangers that must not be overlooked. Precisely here a little knowledge is a dangerous thing. It will be well for that city which in this crisis does not have some citizen who has a pet engineer friend, who knows all about sewers, and more too. We had a water-works engineer of that variety in Canton in 1871. He planned a system that looked well. The people furnished money without stint. He brought the city's water supply from a lake two miles distant. He forced the water through many miles of cement pipes by means of a Holly rotary pump.

Now, after a lapse of only fifteen years, all has been changed. The lake water supply has been abandoned. The water is taken from a creek. Worthington pumps furnish the water, and the Holly rotaries are rusting and rotting in idleness. All the cement pipes, mains and laterals, have been dug up, and pipes of iron have taken their place. It has been a costly business. It is the penalty of trusting undertakings of importance to incompetent guidance. It should be added that the

ement pipes, the worst part of the blunder, were put in against the stout remonstrance of a minority faction.

The first and greatest requisite, when entering upon work of this kind, is a man, an engineer, whose record of fitness rests securely upon his past achievements. The solution offered by such a man, ought to, and will command confidence, even though his conclusions may be at variance with one's preconceived notions. A wise philosopher has said that "The greatest sign of an ill-regulated mind is to believe things because you wish them to be so." Pasteur says: "To choose a road, to stop habitually and ask whether you have not gone astray, that is the true method." These are safe maxims for our guidance in making choice of men and instrumentalities in planning and executing our public works.

This divergence from the main topic has been made to illustrate the danger of trusting anything in these matters to impulse, prejudice, personal preference, or preconceived notions. Sewage disposal by farm irrigation is, as that branch of the science now stands, the very best for inland cities; wherever it is practicable. If gravity takes the sewage to the farm, and the farm is adapted to the work, and is available, the way is clear. All that remains then is to get a man. Just as at the beginning of the whole enterprise, a man, a capable man, is now the one thing needful. Some may doubt this. But a greater knowledge of the subject will cause their doubts to vanish. I recently conversed with an engineer of highest reputation, who had visited and personally inspected all the sewage farms in England and on the continent. In his opinion, an entirely competent manager of a sewage farm is one of the rarest of personalities. To handle the sewage properly, he must himself have considerable engineering tact. He must be a wise, careful, versatile agriculturalist. The foul flow comes right on, not only when needed, but when not needed; night as well as day; winter as well as summer. He must know how to dispose of it, or it will dispose of him. He must know his market, and must adapt his products to the market. He must have executive ability in the management of men. He must be energetic; he must be honest.

If the farm to be irrigated has a clayey, tough, impervious soil, the obstacles in the way of success are greatly augmented. In the summer and fall months, when the farmer has the aid of growing vegetation and a comparatively dry atmosphere, he may succeed; but in winter and early spring he will often be obliged to lift the friendly gate which the forethought of the engineer has inserted at some favorable point in the sewer's course, and allow the unmanagable current to flow into the running stream. Whoever has entered Paris by the Western railroad has had under his eye the noted Gennivilliers tract of fourteen thousand acres or so, upon which about half the sewage of the city is utilized for irrigation purposes, and he has been struck by the apparently tropical luxuriance of the crops raised. The city does not own this land, but furnishes the sewage-laden water to the farmers along the track of the sewer free of cost. Owing to the greatly increased fertility of the soil, the enormous crops raised on the land several times each year, and the close proximity to the markets of the city, this land has become exceedingly valuable. Extensions are made to these sewers yearly, and lands in the track of the proposed extensions double and quadruple in value, even while the coming sewer exists only in anticipation. The success of the Paris experiment has doubtless won many converts to disposal by irrigation. It might be wise for cities generally to undergo a similar conver-

sion if, close by their sewage farms, there flowed a navigable river like the Seine, into which the constant current could be turned when not otherwise needed. For, as a matter of fact, the French farmers take it only when, and only in such quantities as they please. In those seasons when it is not in demand, it passes directly into the river. It is well understood, however, that those seasons of the year in which danger from water contamination is most to be dreaded, are precisely the same in which the sewage is utilized on the land, and the effluent, deprived of its infectious properties, before passing into the river, is, therefore, in a sanitary sense, very greatly improved even by this partial purification. It has, however, been demonstrated that with an abundant area of the sandy, loamy land best adapted to irrigation, the sewage can be disposed of, even in winter, without creating a nuisance. In the harsh climate of Dantzic, Germany, the report on this method of disposal is favorable for the year round.

If a pumping plant is required, another difficulty is presented. Sometimes more than one pumping station is needed in order to obtain sufficient fall to carry the sewage to the required distance. This part of the work is not within the domain experiment. The engineer furnishes the estimates, and it becomes simply a matter of dollars and cents.

If a sufficient area of suitable land, favorably situated for the drainage and disposal of the effluent can be had, the acquisition of the farm by the municipality is also a financial question. Tracts of land required for municipal uses are apt to take a sudden rise in value. The prejudice of neighborhoods against receiving into their precincts the sewage outflow of a city is a factor that must be reckoned with. It can make itself formidable through the courts, entailing delays and a heavy item in the expense account.

If the farm is well chosen and well managed, this prejudice should disappear, as it has in instances which might be named. But if either the conditions or the management entail a nuisance, then the new situation becomes embarrassing all around. Notwithstanding these possible obstacles in the way of irrigation as a means of disposal—the enumeration which has consumed an unexpected portion of my time—the opinion that it is, with favoring conditions, to be preferred, is reiterated.

The number of Americans who can lend to their statements on this subject the sanction of experiment, or personal observation is, unfortunately, very restricted. Suggestions and opinions must necessarily be the result of a study of the reports of scientists and engineers in the older countries. Many of these reports claim success, but that is not all we want to know. We must not jump at conclusions. We must make careful, comparative examination of the shape, size and material of all the stones upon which this success has been reared. The engineer in charge should, in the absence of obvious facilities for crude disposal, have the complete grasp of, and equipment for, his work which has already been indicated.

Upon one point, however, we can all agree—the pressing need for intelligent and unrelenting effort in the dissemination of sanitary facts. The noblest philanthropy could ask no more promising field than this. True, it involves a conflict with popular prejudice and parsimony. This is sure to be provoked by sanitary improvements and restraints. Local public men fear the loss of prestige, and politics of the baser sorts bars the way. But it involves also the moral and material welfare of all the people. The verified conclusions of Pasteur, Tyndall, Koch, Flint, Sternberg, and of

many other investigators who press closely after these, have removed doubt as to the nature of the causes of many of the maladies that afflict the human race. There are murderous things around and about us that, until within a few years, have never been thought of or dreamed of. These, if they do not of themselves communicate disease, do, at least, furnish the wings and stings with which filth diseases work their terrible chastisements. These malignant influences pass, by the aid of polluted waters, into the stomach and intestines; and by the medium of air laden with the exhalations of filth-sodden ground, into the lungs. It is the aim of sanitary effort to prevent this class of preventable diseases; to remove their causes, and to effect that removal and disposal so that society will be benefitted by its improved health, and its husbanded resources.

We Ohioans easily pardon ourselves for entertaining rather stilted ideas in regard to the place of our cherished commonwealth in the great republican family. After passing beyond our borders, and while tripping it hither and thither, we are quite used to hearing the names of our great men classed as the nation's greatest, and ablest, and best. In general thrift, enterprise, and industrial achievement we are rarely asked to take a second place. To hear our State named by foreign lips gives us a pleasant sensation that is closely akin to pride. But a work yet remains; and on the part of many of our cities and rapidly growing towns a great work yet remains to be done before, to the other merits we may justly lay claim to, can be added the crowning merit of CLEANLINESS.

Following this paper was one by Dr. N. S. Everhord, of Wadsworth, entitled:

THE RECURRENCE OF TYPHOID FEVER AS AN ENDEMIC.

Ever since portions of the human family have congregated, as in villages and cities, and have engaged in varied industries, and, I may safely add, ever since there have been enough of them to form anything resembling in numbers an army, and to engage in war, which seems to have been shockingly early in our history, it is probable that typhoid fever has occurred and recurred as an epidemic, or, as I have been in the habit of expressing it, as a limited epidemic. It has occurred probably in nearly all countries, in all climates, and in all seasons, although preferably in especial seasons of the year, as we will notice further on. It has not selected for its victims the feeble, the very old, or the very young, but rather the strong; from the armies, the men of valor; from the homes, those whose age and vigor of health suggest day-dreams of years of activity and delight.

Unlike the diseases which occur in dreaded epidemics at long intervals, and arouse us to combat them on account of greater apparent danger, it is ever-recurring in our own country; in every State in every year; in times of peace and in times of war. During the war of the rebellion, "the deaths from disease were far more numerous than all the slain in all the battles, and all the wounded who have since died or are yet likely to die of the injuries received in the struggle;" and I quote from the record when I say that, "in a general way it may be said that each year about one-quarter of the men suffered from some form of the fever; that the deaths amounted to about two per cent. of the entire strength, and that the whole number of deaths from the fever during the first year was nearly one-half the total mortality from disease." If we had a record as complete and accurate of any other period of our history the fre-

quent prevalence of this disease would suggest but little more security and no less cause for watchfulness, especially as this is precisely the disease which we believe most under the control of hygienic measures.

Typhoid fever is never an epidemic disease; that is, in the sense that from one point of origin the poison is conveyed through the atmosphere over wide-spread territory, as is true of cholera, epidemic bronchitis, and the epizootic, which was so general and so recent that it will be remembered by all. Its special nature, however, is just as well defined, and the cause, whatever it is, has just as certainly specific vital attributes, peculiar to itself, as either of the diseases just referred to; but it is always a disease with "*local foci*," and if it prevails simultaneously over wide-spread territory the special cause, whatever its origin, must have become a local quality of the soil or water in the section where it prevails.

The natural history of this disease has often been studied on thoroughly scientific principles, and no better opportunity is afforded than when the disease has a known source, as when it occurs in the winter or early spring in a locality where it did not prevail during the autumn, but has been imported by some individual from a locality where the disease did prevail in the season of the year favorable to its reproduction or to the breeding of its cause.

Without venturing an opinion at this time as to the nature of the cause of this fever, except to reiterate that it possesses certain specific vital attributes peculiar to itself, I think it a favorable indication of an advance in our knowledge of this disease, when it is no longer accepted as authoritatively settled that "in the vast majority of cases the poison is spontaneously generated." With a profound respect for the great men who have proven this position true, and also for those who have, equally well, proven it *not* true, and with the average regard for written authority, I sometimes reflect over my own somewhat unscientific observations during a series of years and arrange myself on the side with those who do *not* believe it is ever spontaneously generated.

That the evacuations from the bowels of a fever patient, after a certain time, under favoring circumstances, contains the poison in a potent form, and that one individual may transmit it to another, thus infecting not only other individuals, but other localities, I think is conclusively proven. Perhaps none would venture to dispute it; and as all knowledge is progressive, one point absolutely established is of much greater value as a basis from which to attain to others than an apparently plausible theory.

The question is often asked by interested people when typhoid fever prevails in a locality whether the disease is transmitted from the first case by contagion or whether the subsequent cases do not proceed from the same source or local condition which produced the first, supposing that if the disease is not contagious, it must have its origin in filth or some grossly unsanitary condition of the locality, and not taking into account the fact that one patient reproduces the cause and may reproduce all the conditions necessary for subsequent cases without supposing contagion.

To a physician who has often observed the disease and studied its history all attempts to illustrate must seem tame and stale, but, wishing to emphasize the necessity of certain sanitary measures to prevent the recurrence of this fever, I think I may be pardoned for referring to a few incidents in my own experience.

A young man from a village in Ohio went to a village in Missouri and there engaged in teaching. Becoming ill, he attempted to return home, but succeeded only

in getting as far as Southern Illinois, where, at the house of a friend, he had typhoid fever, and died. A younger brother went from Ohio to this place and remained with him during the last few weeks of his illness, and then returned home and was taken sick with the disease. In three weeks his mother and sister at Wadsworth, Ohio, who cared for him in his sickness, also had the fever. In this instance the first individual certainly conveyed the germ from Missouri to Illinois, and the second case from that place to Ohio, neither of the subsequent cases having been at the place of origin of the preceding case. If we exclude contagion, we must admit that each individual case created all the conditions, outside of himself, necessary to reproduce the disease, though we might admit spontaneous generation in the first.

The town in which I reside at one time enjoyed the distinction of being the location of a college or sectarian school. A young man who had been a student at this school had typhoid fever in Illinois, and when convalescent returned to the school and occupied a room on the third floor of the building, where he had a relapse of the fever. He had all the usual symptoms of the disease, including severe diarrhoea. He was so situated in the building that the students in attendance at the school did not come in contact with him, and had no possible chance of contracting the disease by contagion. In three weeks, however, so many were sick with the fever that it was found necessary to discontinue the school. Many of those who suffered simply came there to recite, not taking any meals there, and never were on the same floor of the building with the patient. As there were no other cases in the community, all agreed that the source of the disease was connected with the school, and as all drank water there, it was the opinion of all that the cause of the disease was in the well; and it will require no great stretch of the imagination of a physician to understand how it got there. The first cases were very severe and prolonged. The later cases gradually became milder, until the last ones that occurred would scarcely have been regarded as typhoid fever but for their relation to the severe cases. The well was cleaned out and search was made for a cause of the supposed pollution of the water, but nothing was found in the well but a few old tin cups and pieces of chain, which could probably be found in the majority of wells on school premises. When the school resumed no new cases occurred, and I do not think that any would have occurred even if the well had not been cleaned, as the poison had already become so diluted that it had nearly lost its potency, as manifested by the last cases. There was no constant source of supply in this case as when an infected privy-vault or cesspool drains into a well; but by a disgustingly careless act of the nurse the well was infected from the first patient. The poison, however, could not long retain the power to infect, or reproduce itself, even if the water had not been drawn from the well. Fresh well water is not the kind of material in which infectious poisons breed or reproduce themselves.

The students who were taken sick here were taken to their homes, and not one case occurred in their homes, which certainly would be expected, on account of the number thus subjected to a exposure, if the disease is ordinarily contagious. This instance illustrates quite satisfactorily, to my mind at least, how the poison sometimes gains access to the human economy. If we could know positively how and under what conditions disease germs are generated, and just how they gain entrance into our bodies, we could certainly plead but indifferent excuse, if, seeing those conditions before us, divining the danger and the warning, we are not forearmed. Undoubtedly the poison is sometimes inhaled, the infectious material depositing itself

on the mucous tissues of the bronchi and in the lungs, and the disease spends its force in some instances largely upon these organs, but in the great majority of cases it gains access to the digestive tract through the mouth; in other words, it is swallowed.

In the summer of 1874 my neighbor, a widow lady, built a house on a lot that had long been vacant, in the central part of the village. When the house, the well, and all the out-buildings were completed, she received day boarders, so that her family, including herself, one child, a servant and boarders, numbered ten. In a remarkably short time this entire number, excepting the child, were sick with typhoid fever. The first six cases were very severe, while the later cases were much milder. One young man, who did some work about the premises, also had the fever. There had been no sick person there to import the disease from abroad. There were no other cases in the community. The patients were distributed about in other families, and no cases followed from contagion. The majority of the patients while boarders, were in the house, only long enough to eat their meals, and all left immediately after the first case occurred; but all that drank water from the well, excepting the child, were sick within two weeks after the first case occurred. Everything about the premises was scrupulously clean; no old, vile drains from the kitchen door, which might lead to the well; no foul privy vault; but everything was new and clean, so far as one could see and a well-developed and reasonably well-cultivated nose could detect.

There was no neglected cellar; no decaying vegetables were in the back yard, and there was no connection with any sewer; yet the cause was evidently connected with the house. Now, if the poison of typhoid fever is spontaneously developed under such circumstances, certainly filth is no very important part of the conditions required. If it is, one who has made the rounds of the town, through the alleys on a warm autumn night, observed the disgusting accumulations and breathed odors vile enough to raise the diaphragm of a decent buzzard, and this in localities where typhoid fever has not been known to occur, will be puzzled to explain it. When a boy I believed the itch was spontaneously generated, or that it ever lingered in the atmosphere about certain families, and that the *pediculus capitis* was the unconquerable parasite peculiar to a lad with unkempt hair, who would persist in sitting dangerously near me in school. Many things which we do not understand seem exceedingly mysterious, and we wonder if we shall ever know them. When we do know them we wonder that we did not always know them. In the fever-afflicted family to which I have referred the poison may have been conveyed to the premises and to the well by means which would not be suggested by any circumstances of which I had any knowledge, but I could not avoid observing that the newly dug well was situated in precisely that part of the lot which had long been used by the residents of the adjoining lot as a common dumping ground for everything offensive, as well as the waste from the kitchen; and that this family, at least once to my knowledge, had suffered severely from typhoid fever. Is it not probable that the fever poison was latent in the soil through which this well was dug, and was rendered active by favoring influences attending the disturbance of the soil, and the consequent exposure to the atmosphere, and that it may have found its way into the well? In Pepper's System of Medicine is quoted this instance to show how long typhoid fever discharges may retain infective properties:

"To a village free from typhoid fever an inhabitant returned suffering from the disease, which he acquired at a distant place. His evacuations were buried in a manure heap. Some weeks later five persons, who were engaged in removing the manure from the heap, were attacked by typhoid fever. Their alvine discharges were again buried deeply in the same heap, and nine months later one of two men who were employed to complete the removal of the manure was attacked and died." Now, the author says: "If we assume—and there is no reason to doubt that this point was fully investigated—that the patient in the latter case had not been otherwise exposed to the cause of the disease, the observation shows that the dejecta in typhoid fever retain their virulence nine months. If for nine months, may they not do so for a much longer period?—for as many years, for example? No probability is violated by this hypothesis. On the contrary, it is in full accord with what we know of some of the lower forms of life, and will serve to explain many outbreaks otherwise inexplicable."

A certain locality, near enough my home so that I have been able to observe its annual crop of autumnal fever, has interested me for many years, and certainly for more than twenty years there has not been a failure, and each season has been productive. This is not a city; it does not even rise to the dignity of a village, it is simply a "corners," a "cross-roads." On the northeast corner is located a school house, in appearance very old, but not neglected, in fact it rather looks as if it were wellnigh worn out by persistent knowledge seekers, and I have heard one man say, "but for this school house he would not be any better informed than other people." On the northwest corner is a church, which, in appearance, is much newer, but, also, unassuming; in fact, unfinished, (I hope not unattended, though it has been said, that but for the women and children, one might be lonesome there on the Sabbath, and in this it is said it affects the fashion in the city.) On the southeast corner is a saloon, which has the average look of thrift and prosperity which attend places devoted to this industry. Unlike the church there is no apparent cause for complaint on account of the non-attendance of the men, and it is known that there has been at least one murder committed here, and this is quite like the city. On the southwest corner is the home of a laborer, and I will presume him a true representative of "Progressive Democracy," or of discontented labor, and, if so, he probably *imbibes* more ideas, and gets more "pointers" from the southeast corner than from either the school or church.

On the street west from this corner are located about one dozen houses, built at various times during as many years. They are owned and occupied by prosperous, well-to-do laborers, and have a general look of cleanliness and comfort. On the south street are several farm houses. On the north street one farm house near the corner. Within this district there are probably twenty residences, and for the last twenty years, each autumn, typhoid fever has occurred in one or more of these residences. The first case, so far as I am able to ascertain, occurred in a farm house near the cross-roads. To this house a young man came sick with the fever. He was not sick enough to be confined to the house for some time, being what was termed a walking case of fever. After a few weeks this family with whom he stayed was sick with the fever, and two, I think, died. Since then this house has been occupied by two or three different families, each of whom had the fever, and as near as I can ascertain the exact number, fifteen cases have occurred in this house during this time.

[In the new houses built within this district the disease would usually appear the first or second autumn of the building, especially if occupied by families removed from another locality. Now why should this disease recur here each year if this is not an infected district? Why occur in recently built houses, with everything about them new and clean? These people breathe the same atmosphere as do their neighbors, and why does it always recur in the autumn after warm and dry weather? Ask one of the residents the source of the disease, and he will answer it must be in the water. But what is there in the character of the soil here, that will, in this particular season of each year, give such a quality to the water? Is it not possible and very probable that the soil here contains the germs of the disease, and that the favoring influences of continued warmth, and a lowering of the water level, either by vitalizing or by greater concentration in the water, gives to the poison a potency, which those who are not protected, either by a former attack or by habitual exposure, can not resist?

The belief has long been entertained that there is some sort of antagonism between typhoid fever and the different forms of malarial fever, and it is undoubtedly true that malarious districts are to some extent exempt from typhoid fever. But is not the apparent antagonism of poisons rather due to the opposite conditions of soil or subsoil? May not the very draining of the subsoil of "low and moist localities," which is by preference the home of malaria, the better fit it for the breeding of the typhoid poison? Certain it is that there is no antagonism between the poisons, for individuals suffering with malarial fever have so often been attacked with typhoid fever, that this manifestation of the two diseases in the same individual during the late war, gave rise to the name *typho-malarial fever*.

While the natural history and behavior of these specific poisons may always seem somewhat more obscure and less palpable to the average mind than the pestiferous mosquito or the festive flea, yet, to study them as manifestations of the lower forms of life will certainly better prepare us to combat them, than if we think of them as incomprehensible myths, without vital attributes. Think of it in any form you prefer; imagine it spontaneously generated in every foul and offensive accumulation, but remember this as settled beyond all question, that it lives in the alvine discharges of the typhoid patient, and that after a certain time, influenced probably by warmth and degree of moisture, it becomes active and potent to reproduce the disease and itself; and that foul and offensive accumulations are pre-eminently the soil favorable to its breeding and self-preservation. I hope that whatever you may think of what I have said, you will accept this last proposition as substantially true, and that all who feel enough interest in a sanitary meeting to be present here, and who have been patient enough to hear me through on this uninviting subject, but which may at some time become to any of us a mighty important subject, will insist, when occasion occurs, that the instructions issued by the State Board of Health be acted upon, and the discharges from those sick with typhoid fever be thoroughly disinfected.

I think this so important that if people do not act upon this or the instructions of their physicians, there should be a law enacted compelling compliance.

For several years past, where I knew such instructions would not be faithfully carried out, I have instructed those who had care of the sick to empty all discharges into a place dug into the ground, and each day throw in liberal quantities of coprapas. Some such plan as this will often be followed, because less troublesome,

when the others will not. Such discharges should never be thrown into a privy vault, and patients sick with fever should not be allowed to go to a privy. In fact a privy vault should not be tolerated any where. Such a contrivance and a well in the same door-yard, are perfectly abominable at all times, but if one has been used by a fever patient it should at once be disinfected. It is really astounding to hear a farmer tell you that a drain through his field three feet deep will drain the soil three or four rods on either side, and then see him dig a well forty feet deep within three or four rods of an out-house, with a foul and offensive vault, apparently not thinking that the well may drain this and the earth about it, because it is not dug for that purpose.

THIRD SESSION.

THURSDAY, March 31—9 A. M.

The first paper of Thursday's session was read by Dr. McCurdy, as follows :

HEALTH BOARDS.

BY JOHN M'CURDY, M. D., YOUNGSTOWN, OHIO.

It is a curious study to go back to the earliest records we have, and watch the work, ings of men's minds. We find that the brightest intellects and leaders of thought spent their time in writing about mythological deities, and creating new fancies that in no way added to the substantial achievement of life, or the protection or advancement of the well-being of the race. We read in various authors, of the God-like achievements, valor and strategy of Ulysses ; of Hector, the mightiest of the Trojan heroes, who lost his life by mistaken confidence ; of Circe, the fair-haired Goddess, whose pastime was to change at pleasure, either friends or enemies into wolves, lions, swine, etc., but no flash of thought reveals the laws that govern human life, or secure the blessings of health.

What was the result of this criminal carelessness? Why, plague chased plague in rapid succession, contagious diseases followed contagion, and infectious diseases followed infection as one crashing wave of the angry ocean follows another until the beach is strewn with nothing but fragments.

These waves of death nearly always rose and showed their white-caps of fury in the far east, then rushed westward ; and to-day, when the storms of human destruction are first heard, we look eastward.

Have we a reason for this? Hear what the earliest writer says of Mesopotamia, where the plague brooded before starting westward with her devouring progeny : " The ground is so saturated with moisture that the refuse of the village is neither absorbed nor evaporated, but acquired the form of bluish-black oily fluid that surrounded the huts and covered the paths and stained the walls for two feet from the ground, and in fact the village is in such a state of filth that it requires to be seen to be appreciated." And in India, which is also either its birth-place or home by adoption, the same writer says, " the people were filthy beyond conception."

This same period shows the cities of Europe in much the same condition, and this state of affairs continued until the seventeenth century.

In these remote times the records are too imperfect to learn the number destroyed, but we find that in the sixth century, their most frequent visitor, the plague, touched at Constantinople, and in one day killed 10,000. It also visited Italy in the same cen-

tury, and laying its grip of death upon the whole land, her strong arms were paralyzed forever, and the Lombards came in and possessed the land.

This same epidemic found its way to China and destroyed 13,000,000. No country in Europe escaped. It reached England in the fourteenth century, and two-thirds of the Academical students of Oxford were lost.

In some countries three-fourths of the inhabitants were swept away. Twenty-five millions in Europe alone lost their lives, and this does not approximate the number of afflicted, as in this, like all other diseases, there is a mild as well as a severe form, so that 100,000,000 would be a cautious estimate of the inhabitants attacked. In the fifteenth, sixteenth and seventeenth centuries this dread visitor came to London, Edinburgh and Paris, and remained long periods.

For eight years continuously this disease remained in London, and as week followed week, 1,000 hurried to their graves from this malady alone, and at that time London was not a very large city. After these death cycles had come and gone, large portions of the visited country were left without people to till the soil, and in numberless instances, the people, in their terror, with a hope that their gifts, as was promised, would gain them Heaven, gave large possessions to the Church. As late as the seventeenth century Naples, in all her beauty and her dirt, lost, in five months, 300,000.

All writers agree that whether in London, Naples or Paris, uncleanness was the cause. So little could this disease be controlled when at its height, that each house afflicted had placed upon its front a red cross and the legend, "God have mercy upon us."

So marked was the precision with which this plague aimed its poison-tipped arrows at the foul, the squalid and the poor, that it was called the "poor's plague."

During one of the latest visits of this disease to London, Oxford wholly escaped, although in constant communication with that great city. Why? The Chronicler says because Oxford was scrupulously clean, with good drainage. We find the first feeble flickerings of preventive medicine was attempted in the eighteenth century, in the shape of quarantine. This quarantine, like all others, was substantially a failure. About this time Marseilles was invaded, losing from 40,000 to 60,000, and upon her streets thousands of corpses were seen lying putrid, with no adequate means of burial. In the midst of this gloom it is encouraging to note that the fury of these attacks grew less and less, until finally this arch enemy of mankind no longer claims the people of Christian civilization as its own.

The frequency of its visits would seem to insure familiarity, yet passing strange is it that not until 1833 was this disease studied in a thorough and scientific manner.

I have given but a few of the startling facts relating to but one form of contagion. Time will allow but a simple mention of others, as cholera, smallpox, yellow fever, typhus and typhoid, putrid sore throat, now called diphtheria, etc. In trying to number their victims, who could appreciate the immensity of the figures, or the desolations and the sorrows they have wrought?

Many questions, both pertinent and vital, could be asked relating to the nature of, and laws directing these hurricanes of death. As for instance, why when either disease mentioned attacked the Russian, Turkish, German, French and English armies, it left "their tents all silent, the banners alone, the lances unlifted, the trumpets unblown," while during our gigantic struggle with millions encamped, they came not nigh "to molest or make us afraid."

Why is it that cholera attacked our land both east and west in 1832, and again in 1850? But in 1863-64 and '65 it visited South America, but not one point in North America. Why was it that in 1866 it touched but one city in the east; again in 1873, it came to New Orleans and the great river, but not one point in the east, either city or coast? And why is it that to-day neither England, France, Germany nor America will crouch with cowardly terror at any form of disease? Let us now turn and look at this subject in another light. We ask, was it in the power of our ancestors to live longer and better than they did? Was their interpretation of the Scripture precept, "sufficient unto the day is the evil thereof," the correct one when it allowed them to let each day, year and decade pass over their homes without putting them in order for "the pestilence that walketh in darkness and the destruction that wasteth at noonday?"

They deserved the awful sentence, "your sins be upon your own heads, you have sown to the winds the seeds of contagion, and you must now reap the whirlwinds of affliction, poverty, sorrow, insanity, crippled bodies and death." It was not until the eighteenth century that the thought came to them that, perhaps, all these desolations were not visitations of God, but the sequences of their own corrupt and profligate lives and their appalling foulness of person and premises. This was the thought that gave birth to preventive medicine. The first efforts of those countries by way of prevention brought a new sun into their heavens, and with it new resolves and new hopes. A little practice soon proved to them that they could lock the jaws of their old enemy scurvy that had slowly gnawed so many of them to death, take the rigors of ague from their bodies, and throw the lance of protection fairly into the vitals of their old enemy smallpox.

Thus started, many of the nations have gone on until they have unlocked, one by one, the doors concealing and protecting nearly every form of contagion and infection; and what is their condition to-day? they have said to the plague, "back to the infernal pit I drag thee chained, and seal thee so as henceforth not to scorn the facile gates of hell too slightly barred."

They say to cholera, we know thy ways, and can surround thee and destroy thy power by fire and germicide, as surely as the sun's rays surround and destroy the darkness of the night. They can say to typhus, typhoid and relapsing fevers and diphtheria, we know your habitations in the sink, the sewer, the closet and the garments of the unwashed, and can starve you to death by enforced sanitation and hasten your final departure by disinfectants. Yes, the day has gone forever when we shall hear of plagues or pestilences in an epidemic form in America, England, France, or Germany. Their habits and haunts are as familiar to the sanitarian, as are those of the devouring hyena, or the crouching tiger to the naturalist.

While cholera raged unhindered in the hovels of the coarsely fed serfs of barbarous Russia, or in the dark, underground habitations and reeking cabins of ignorant, squalid, starved Italy, it was summarily stamped out in France, although attacking her in her most vulnerable part, Paris and Lyons. Why is it that when cholera now tries our coast it always finds a nidus in New Orleans, but not at any point in the east? It is simply that our eastern friends get their habitations in order by sweeping and garnishing. Why is it that the people are so slow to enact statutes for the enforcement of sanitary regulations, if what has been said is true? The people have seen, again and again, vessels steaming up to our great coast cities with cholera, yel-

low fever, smallpox, typhus, etc., and instead of fleeing as of old, leaving their homes, property, aged, sick and poor, they have remained to guard their own hearth-stones, and pursue their daily callings in security; for they believe the health officer when he assures them he can throttle these monsters at the city's edge, and destroy both them and their issue in from three to ten days. Should not this protection be given to the whole people?

New York had laws as early as 1800, preventing outsiders from approaching her with pestilence, but it was not until 1864 that even a sanitary inspection was made of herself, and then only in a private capacity by a few of her citizens. It was not until 1866 a law was passed establishing a board of health to protect life and prevent the spread of disease.

Massachusetts, the mother of New England civilization—by far the highest type ever established by man—could not get a State board of health until June, 1869, although continuously asking for one since 1850. The great State of New York, although the common highway for the immigrants of the old world, seeking western homes, did not succeed in getting a State board of health until six years ago; and our own good State, although she sent representatives to the first sanitary gathering ever held, could not get a health board until last year. Was this state of things simply the result of carelessness on the part of the people? Not by any means. There is a fixed determination on the part of vast numbers to hold fast to what they style their own personal liberty, of throwing offal, sewage, and all offensive matters just where and when it suits their own private convenience; and the hardest lesson civilization ever gave her people to learn and practice, is that of cleanliness of person and home.

England, the birth-place of the Anglo Saxons, who consider themselves by far the most intellectual, energetic and advanced people upon the globe—and of course they are, as we belong to that race, was the first to stand up and fight dirt, and enjoy, as the outcome of that battle, freedom from their old enemy, the plague, a disease now no longer known in England; also freedom from cholera, yellow fever, and smallpox, which now only exists as isolated cases, never in the epidemic form; yet their filthy instincts are so strong, that gratify them they will, and woe betide the health officer that dares prevent them, save when the black clouds of death are moving toward them from some stricken country. For instance, in examining the health report of Dr. A. P. Stewart, as late as 1866, I see the people will not appoint health officers in places containing a population from that of the village to the city of 200,000. The appointment of a health officer is optional, and in fifty such cases, not even an inspector of nuisances could be found. And even in metropolitan districts, but two officers are allowed to a population of from 163,000 to 211,000. The health officer in that country that dares to be active when no epidemic prevails, will soon lose his official head. A graphic instance of this is found in the case of Dr. Robinson, health officer of Leeds. When this official was installed he found "he had to grapple with unparalleled privy abominations, piggeries by the hundred, numerous slaughter houses, the gigantic smoke nuisance, and an average death rate of thirty to the 1,000." The battle between science and filth was prolonged and terrific, and piggeries were made the battlefield. The pig owners taking alarm at Dr. Robinson's energy, formed themselves into a "pig protection society," summoned ward meetings, and commenced an active canvass for the purpose of turning out of the council

all who would not pledge themselves to vote for Dr. Robinson's dismissal. How is it with us in similar matters? The same spirit prevades our land from ocean to ocean, and there is not one town in America that will not fight for its so-called personal liberty, and inalienable rights, if compelled to abate any form of abomination. They will defy their Creator rather than heed His precept, "for none of us liveth to himself, and no man dieth to himself," insisting that they will live as they choose, and take their chances. For instance, what think you of the old city of Trenton, N. J., without sewers? Inspector McGuire reported to the board of health that for want of sewers, cess-pools were overflowing in all directions, and for want of room, many made cess-pools in their cellars, which overflowed and the contents forced their way through the walls of adjacent buildings, causing a stench not to be described. Even in Newport, where "*tony*" people go for health, the foulness is great, caused by closets close to the wells. A short time ago Judge Mallory, of Milwaukee, had to call a special grand jury to investigate and stop the defiant breakers of health laws, who boldly threw into the river each day two hundred tons of filth, until its channel was solidly filled from four to six feet.

Shenandoah, Pa., is a place of more than 16,000, and not one yard of sewerage.

In Patterson, N. J., the health board decided that in certain streets the water was contaminated, and ordered its use discontinued; but no, the people said they would use it in defiance of the board of health.

Health officer Veal, of Philadelphia, says that in the Sixteenth ward, the people use water from wells and the Delaware river unfit for use, and in consequence have furnished one-half of all the typhoid fever, although but one-fifth of the population, for five weeks ending August 28th. The Brooklyn Eagle says, no city in the Union has so foul a pest-hole at its boundaries as Brooklyn. The sludge acid discharged from the works of the Standard Oil Company, seems to possess an ominous potency for stirring up the sewage in the creek, and its black and thickened current seeths with bubbles of sulphuretted hydrogen; the shores banked with this acid and nameless filth, poison the atmosphere at low water. When to the oil industry is added the manufacture of fertilizers, and a plenitude of pigs along Queen's county shore, the source of supply for a great nuisance or a grievous plague are discernable to all but official eyes and nostrils, and our health commissioner is authority for the statement, "that you might as well fight the devil as the Standard Oil Company."

Bellaire, in our own State, has been compelled to drink the sewage, night-soil, dead animals and offal of Wheeling, and our State Board of Health can tell you the result. You can get an idea of what surroundings do for a people, when I tell you that in Savannah, Ga., the whites die only at the rate of 12.19 to the 1,000, while the colored people, confined in alleys of that dirty little city, die at the rate of 122.94 to the 1,000, and of the children born to these colored people, 600 to the 1,000 die.

Dr. McLeon, of Brooklyn, found 140 cow stables where the animals were all far advanced in that fatal disease, pleuro-pneumonia, yet these cows were milked, and the milk was sold daily.

I could multiply these facts indefinitely, but hope I have shown that individuals, corporations, villages and cities, all need watching; life not being of the value of a pebble in their grinding course, when greed is unrestrained.

Health boards mark the highest type of civilization yet reached. They are yet infants in years, as not until 1869 was one created in our nation, yet disgraced indeed does that State feel without her health board.

Thousands of municipalities have surrounded themselves with these protectors. You now ask, have they justified their formation? Let facts reply. Before Memphis could be induced to build her forty-five miles of sewerage, she lost 45 annually to the 1,000; now she loses but 17 to the 1,000.

Dr. DeWolf, the efficient health commissioner of Chicago, reports that by the thorough inspection of tenement houses, and making builders of same obey State laws, the death rate was reduced from 26 to the 1,000 in 1878 to 18 in 1885; and in the model town of Pullman, a suburb of the city, the death rate is reduced to 6.9 per 1,000, while in Hyde Park, near the same, but not under such correct sanitary inspection, the death rate is 15 to the 1,000.

Manchester, England, a city of more than half a million, noted for its dry earth closets, and all under the direct care of the city government, reduced the death rate to a point that in three years saved the lives of 17,715 people. As before stated, England has signally enjoyed the direct protection of sanitation, and finds that the death rate can be easily kept at 15 to the 1,000. She finds that in 1865, her general average was 23.4; whereas, if she had brought it down as in inspected towns to 15, she could have saved the lives of 176,324 of her people each year.

From the above facts we see that man is his own worst enemy; every plague, epidemic, and pestilence is the result of broken laws. Cholera, yellow fever, small-pox, diphtheria, dysentey, typhus, typhoid and relapsing fevers, and all forms of malaria, cerebro-spinal meningitis, and puerperal fevers are all preventable afflictions.

The Mosaic health code is the only one we have ever had approaching perfection, and no epidemic ever distressed that people save as a direct punishment for disobedience. What maladies would the physician have left to exercise his skill upon if those mentioned were prevented?

All nations now enjoying the Christian form of civilization have established executive, legislative and judicial departments, and recently have reached a still higher point by establishing health departments.

Shall we not then accept the logic of experience bought by so many valuable lives and centuries of sickness, and faithfully adopt and practice that which brings length of days in her right hand, and in her left hand, riches and honor?

Discussion.—Dr. Hole, of Salem, said the people were willing to do much when properly instructed. He hoped the State Board of Health would have the papers presented at this convention published and widely distributed.

Mr. Hartzell said he was much interested in the paper. It showed the bad habits of our people and the great necessity for boards of health. One case of typhoid fever improperly managed had cost the people of Plymouth one hundred deaths with eleven hundred sick.

Mr. Hartzell called attention to a small stream near Warren, into which the sewage from the county infirmary was being emptied. In July fish were killed in the stream, and cattle refused to drink it. This run emptied into the Mahoning river, and it behooved the people of Warren to look to it in procuring their water supply.

Dr. Harmon replied that fifteen years ago they had adopted the dry earth plan, but had abandoned it. It would be remedied before completing their water works.

Dr. S. H. Smith, of Warren, read the next paper, entitled :

NATURAL AND ARTIFICIAL SOURCES OF MALARIA IN TRUMBULL COUNTY, OHIO.

BY DR. S. H. SMITH, OF WARREN.

Trumbull county is situated in the northeastern corner of the State. It is out of the most malarious districts of this State, still it is not free from malaria, although the acute diseases, produced by this poison, are not as frequently met with here as they are in some other parts of the State, malaria is with us always, and it complicates many of the diseases we meet with to-day.

The population, in 1880, was 42,867, or about seventy persons to the square mile, and it is probably about the same now, as a large per cent. of the mining population have removed from the county, since that time.

The people are principally engaged in agricultural pursuits, though there are several hundred coal miners, and a number of large manufacturing establishments in the southern part of the county.

This county forms part of the ridge which divides the great water sheds of Lake Erie and the Ohio river. This dividing ridge enters the county near the center of the western boundary, and leaves it near the middle of the northern boundry; taking about one-fourth of the county into the Lake Erie water shed. This ridge is not well marked in the greater part of its course. The land is quite level, and at almost any point a ditch two feet deep would turn the water from its natural course, for a mile or more.

All of the streams have very slow currents, not to exceed two miles an hour when the water is low. When they are swollen by rains, they overflow their banks. There are more than a hundred miles of open ditches, under the control of the county, besides the private ditches. They vary in depth from one to ten feet, and in width from two to twelve feet.

The Ohio and Pennsylvania canal used to run nearly parallel to the Mahoning river, which was its feeder; and although it has been abandoned for twenty years, there are many places where water has stood in its bed all of this time.

There are three large swamps in this county, and several small ones which contain from ten to two hundred acres. The largest swamp is in the north part of the county, near the eastern line of the Lake Erie water shed. It covers about a thousand acres of land. There is a smaller one in the eastern central part of the county, and one in the southwestern part.

These swamps are filled with peat and quicksand, upon a bed of blue clay. The peat and sand vary in depth from a few inches to forty feet or more. These swamps are all partially drained.

During the existence of the Ohio and Pennsylvania canal, and for a few years after it was abandoned, malaria caused a great amount of sickness in the southern part of the county.

Now you ask, What is malaria?

On certain soil, during warm weather, the decomposition of vegetable matter, produces a subtle poison, which, when taken into the human system, by inhalation, produces a great many different symptoms, which we all recognize as being caused by malaria or marsh miasm. This poison has never been isolated by the chemist, nor described by the microscopist, but we have hopes that it soon will be. Several years ago, Professor J. H. Saulsbury, of Cleveland, announced that he had discovered the germ of malaria; and gave it a name. But a little time showed that he was mistaken, and we found ourselves as much in the dark as we were before. * * *

If the current of a stream which contains this poison be obstructed by a dam, the malaria will be given off by the still water. It sometimes poisons the air to such an extent, that a previously healthy district will become almost uninhabitable. This has happened more than once in this county.

Several years ago a dam was constructed at the mouth of Musquito creek, at Niles, and malarial diseases have prevailed for four or five miles up that stream ever since, where they had rarely ever been known before.

There is something peculiar about Musquito creek. It is a very sluggish stream of black, dirty water. It overflows its low banks two or three times each year, and floods a great amount of land on both sides of it, for several days at a time; but there has been almost complete immunity from malaria along its course. Large families have been raised within ten rods of the creek without a case of malarial disease ever having occurred, and other diseases do not appear to be complicated as much by malaria here as in other parts of the county.

On the other hand, Deacon creek, which flows during part of its course nearly parallel with Musquito creek, only in an opposite direction, and is less than five miles from it, produces and gives off more malaria than any other stream in the county. The cause of this difference is a very interesting but unsolved question.

The principal places where these germs are generated artificially in this county in sufficient quantities to produce acute malarial diseases, are the mill ponds upon the rivers and creeks. Obstructions in the small streams and county ditches where water that has run some distance, and become saturated with the poison, is allowed to stand and become stagnant.

But malarial diseases have never prevailed to any great extent upon or around the three large swamps. For years there was no attempt at drainage, and even now water stands upon them in the driest of seasons, and it would seem, as if we had all the elements here for the propagation of the malarial germs. But still, the effects of malaria are very mild, if noticed at all.

The water supply which will be provided for the city of Warren, in the near future, will be a prolific source of malarial diseases. Water taken from a dam in the Mahoning river, and pumped into a stand pipe, and allowed to stand in large pipes beneath our streets, will be in just the right condition to give off the poison, in sufficient quantities, to produce disease. We must expect the health of our city to suffer from this cause in the future. For a few years the water will not be used much for domestic purposes, but as it will be put into houses it will be so convenient that the wells will be gradually abandoned, and the river water will be used altogether. * * * *

Of course, this can all be remedied, and will be in time, but much suffering, anxiety and grief must be endured by the people of this city, before they will learn that the

first cost of the water works is as nothing when compared to the expense of the sickness and death produced by impure water.

If the swamps and low places, where water stands the greater part of the year were all thoroughly drained, and all obstructions and mill dams were removed from our rivers and small streams, malarial diseases would be quite rare in this county. The cost of the sickness and death from this cause alone, would buy the necessary boilers and engines, and furnish all the fuel for every mill in the county, which now runs by water power. In order that a few men may save a paltry sum, the citizens of the county are not only robbed of twice the amount, but must suffer the anxiety and grief caused by the sickness and death of their relatives and friends, while the county each year loses several of its most valuable citizens, who might otherwise be saved.

If the people of this county could be made to see this matter in the same light that it is seen by the best physicians, there would not be a mill dam in the county on the first day of next September, and the land would be so thoroughly ditched, and under-drained, that its value would be increased for agricultural purposes, at least twenty dollars per acre. If this were done, in two years from now, malaria would be almost unknown here.

Discussion.—Dr. Bascomb commended the paper, and expressed the hope that papers read at this convention would be published, that the people might be better informed as to their duties.

Dr. Miller said the people would not do what they ought. The law for years had given the people, through their councils, the means for having boards of health, but comparatively few cities and towns were provided with health boards. The people cry to the State Board of Health, "Here is a great nuisance, correct it," but when the Board tries to do so the people want to correct the Board.

The Board had thoroughly investigated the pollution of streams by refuse from straw-board works and paper mills. They had tried but failed to indict the offenders. A bill had been introduced in the last Legislature which would have enabled the Board to abate these nuisances. It passed the House but was defeated in the Senate by a powerful "lobby." The Board he said had tried to secure a law giving every city, town, and township a board of health; this too had failed. For the present the Board's work must be educational. He hoped all here would now be friendly to boards of health, and take an active interest in sanitary matters.

The next read was by Dr. Hubbard, as followed :

PRINCIPLES OF WARMING AND VENTILATION AS APPLIED TO OUR PUBLIC SCHOOLS.

BY THOMAS HUBBARD, M. D., HEALTH OFFICER, ASHTABULA, OHIO.

The problem of the ventilation of public school-rooms has special features that are not so prominent in the general question of the ventilation of audience-rooms. School-rooms, are living rooms for the children of the community, and as such, it is of para-

mount importance that they shall be healthful, both in degree of warmth, and in quality of air. The element of compulsion in educational systems throws upon the people, or their representatives, a responsibility, and they are as much under obligations to provide healthful surroundings for the children temporarily in their charge as to encourage judicious mind-training. A wise expenditure of money toward providing healthful school-rooms is generally sanctioned by the tax-payers, but the question *how to secure good ventilation* is debated zealously and often to no purpose.

The public are decidedly suspicious of any one who presents a system of ventilation, so many have been the disastrous failures. Prejudice and untimely economy have opposed, without reason, many well directed efforts toward a rational system of ventilation in the past, and public opinion is notoriously slow in demanding reform in the field of sanitary science and preventive medicine. Educational boards would doubtless profit by association with sanitary organizations, and many well-meant but misdirected efforts might thus be checked, and sanitary science be relieved of undeserved criticism.

The last decade has witnessed a revolution in methods of education. The beneficial effect of this reform is already apparent in the universal tendency toward the practical application of principles studied in the school-room, as noted both in the character of studies and recitations, and schools of manual training. Can it be said that there has been an improvement in the material surroundings corresponding to that in the intellectual atmosphere of the modern school-room?

The habits of home-life and general surroundings must be taken into consideration in establishing standards of warmth and degree of purity to be required of a system of ventilation. However, the general demand for a very high temperature in living-rooms, largely the outcome of sedentariness and variable climate, need not be unreservedly acceded to, and the model school-room can itself become an educator after its own forcible manner.

The pure, wholesome atmosphere of a room free from dust and organic matter in suspension, is certainly a most natural, and probably an efficient disinfectant, and thus one channel for transmission of contagious epidemic diseases is closed.

Our public schools should be regarded as centers for diffusion of the most progressive ideas of the day, not alone in the intellectual sphere, but alike concerning the problems of every-day life, and should stand as working models, constructed with a supreme regard for the teachings of sanitary science.

The following conditions are to be taken into account, (viewing the problem as it actually presents itself, in considering any plan of school-house ventilation and warming. About two hundred cubic feet per capita is a fair average of cubic space allowed. [The small amount of eighty-nine cubic feet is the average in the city of Brooklyn, and three hundred cubic feet in Providence, Rhode Island]. The floor space allowed averages between twelve and sixteen square feet. There is, however, a deception in this statement, since in nearly all cases school-desks are placed as close as comfort will allow, giving in reality a floor space of not over ten square feet, and the balance may be considered only as reserve air space. The question is, *how near is one pupil to another*, and if the distance be not sufficient to dissipate the current of expired air, then reserve air-space, and even an abundant incoming air supply can only partially obviate the effect of rebreathing air direct from the lungs of another, laden with gaseous excreta, and possibly with specific poisons. If, then, it be designed to give sixteen

square feet of floor space to each pupil, the desks should be placed as far apart as the total space will allow, thus giving the child direct benefit of it. Uninterrupted sessions of about one and one-half hours are the rule. The school-room must be well lighted, and there is consequently a considerable loss of heat by the large window surfaces. It is desirable to maintain a temperature of at least sixty-eight degrees, and there should not be over four or six degrees difference between floor and ceiling. A degree of humidity ranging from sixty to eighty-five, one hundred being taken as saturation, is allowable.

As concerns the chemical purity of the air, it is scarcely to be hoped that nature's standard can always be attained, yet such aspirations may not be regarded as extravagant. The animal economy is capable of marvelously adapting itself to new surroundings, yet should we always be on the guard lest we over-tax this innate faculty. Carbonic acid is generally taken as the indicator of the state of the air. It is certainly convenient, but decidedly unreliable in doubtful cases. It indicates by its presence in known quantity an uncertain amount of organic matter, volatilized and in suspension, and gaseous derivatives—as ammonia and nitrites. There is also a proportionate loss of oxygen. These two conditions are the important ones to determine since they represent the deleterious qualities of air that has been breathed. Pure carbonic acid has but little effect upon the animal system in quantities under ten parts to one thousand, while as an indicator of the amount of organic matter present, and lessened quantity of oxygen, one part per one thousand is distinctly injurious. It is quite necessary then to adopt a low standard in order to be on the safe side, and accordingly we have eight-tenths parts of carbonic acid per one thousand as the maximum amount consistent with being healthful.

About six-tenths cubic feet of carbonic acid is given off by the adult in an hour, and it is fair to estimate that average school children give off about four-tenths cubic feet per hour. Atmospheric air contains about three to four-tenths cubic feet carbonic acid per one thousand. Hence one thousand cubic feet of air containing thirty-five hundredths cubic feet carbonic acid would dilute the carbonic acid production of one hour seventy-five hundredths cubic feet per one thousand. This then is the minimum amount of air supply for one hour, namely, one thousand cubic feet. Doubtless twelve hundred or fifteen hundred cubic feet per hour is more safe, but since we have taken a rather high amount for hourly production of carbonic acid by children, we are disposed to adopt one thousand cubic feet an hour, per capita, as a reasonable requirement of any proposed plan of ventilation.

Ventilation may be secured by natural and artificial methods. The latter are extraction and propulsion, and involve considerable mechanical skill and expense in operating. Of the natural methods only one can be depended on as capable of producing the necessary movements in bodies of air. Great and irresistible currents are caused in the Earth's atmosphere by a difference of specific gravity in different localities. Natural heat production is the cause of this change in weight. Artificial heat is capable of producing the same effect on comparatively small quantities of air. Properly confined this effect may be intensified, and the current so caused may be turned to account for the purpose of changing the air in a room or number of rooms. This is accomplished by conducting the heated air out of the building by means of large shafts, thus maintaining the difference in temperature and corresponding difference in specific gravity.

By way of making clear the above principle, let us review the main features of its practical application. Conceive a warming apparatus in basement of building to be warmed, with direct and free communication to outer air; rooms above to be warmed and fresh air supplied through air conduits direct from warming apparatus; a shaft as high as practical, open above, and below only into the rooms. The air from without is warmed about furnaces or steam apparatus, and ascends through air conduits into the rooms; it then passes on into the shaft, having lost some of its heat in the room, and continues to ascend until its heat is entirely dissipated by mingling with the cold air surrounding the outlet of the shaft. In other words, "warm air rises," and its rate of ascent, other things being equal, bears exact relation to its temperature, as compared with the temperature of the atmospheric air, and the height of the column. The cause of its tendency to rise is not expressed in this familiar saying. The difference in specific gravity between bodies of air of unequal temperature is the cause of the warm air rising, *it being displaced upward by the heavier air*. Disregarding the question of friction, it is evident that *height of column and difference of temperature* are the prime factors determining velocity of the air at outlet of the shaft.

The important details of a practical application of such principles are: (1.) Large quantities of air must be warmed to as high a temperature as is consistent with retaining its invigorating qualities; (2.) The air must be detained in the room long enough to part with some, but not all of its heat, before passing on into the shaft; (3.) The currents thus produced in the room must be so diffused as not to be uncomfortable, and all parts must be equally warmed; (4.) It is necessary that the rooms be free from draughts from without, and only when the outer air is quite comfortable can doors and windows be freely opened for purpose of ventilation; (5.) The reduction of friction to a minimum is essential to securing any considerable velocity in the outgoing air.

The system of ventilation to be described is based upon the above principles, but some of its details deserve attention. The furnaces are very large and heavy, and are capable of doing much more heating than can ordinarily be demanded. The warm-air conduits are large and as nearly strait as possible. As they pass from the furnaces through the fresh-air chamber there are valves in the conduits that can be regulated from the room above to let in more or less cold air. The warm air enters at side of the room, low down, and ascends at an angle of about 45°, soon diffusing in gentle to and fro currents over the whole room. The area of the out-going conductors is somewhat greater than that of warm-air register. They are placed in base board, and directly under the windows, thus taking advantage of the natural downward current that exists there. The out-going air circulates under the floor, the flooring being so laid as to admit of this, and thence into the ventilating shaft.

The "dry closet" operated in connection with this system deserves special mention. The air from the room passes under the flooring (thus aiding in maintaining a comfortable floor temperature), and thence into the basement by way of the so-called "foul-air gathering room." This is in free communication with closet vault which opens at the other end directly into one of the shafts. Thus all of the air that passes out of the shaft has first circulated through the vaults, and the contents are dried. So thoroughly is this accomplished that the residuum can be burned at convenient interval. To insure safety in the operation of this portion of the system a small summer furnace is placed in the base of the shaft to maintain the necessary upward draught at times when the large furnace is not in use.

As a test of the practical working efficiency of a system operated on the above principles a series of analyses were made, supplemented by estimates of the capacity of the system by actual measurement of the velocity of air currents and calculations upon proven formulæ. The school building where the experiments were carried on has been occupied since last September. There are eight rooms of about nine thousand cubic feet capacity, two rooms of eleven thousand cubic feet, two recitation rooms of six or seven thousand cubic feet, and an office of about the same dimensions. The average attendance is 468, and they occupy about 102,000 cubic feet, which allows a little more than 200 cubic feet per capita. The building is heated by four large tubular furnaces, and there are four ventilating shafts—two serving as outlets for the rooms on lower floor, five in number, the rooms being divided by a partition in the center of building—so that each shaft ventilates two and one-half rooms, or about 24,000 cubic feet room space. The two shafts on the south side of the building ventilate the rooms on upper floor, being about 60,000 cubic feet room space. These shafts are near the center of the building, and have uniform dimensions of 40 inches by 30 inches, or 8.33 square feet. The distance from outlet to level of floor ventilated is 62 feet in shafts that ventilate first floor and 48 feet in those ventilating second floor. As before stated, the air from first-floor rooms passes into basement and over contents of dry-closet vaults, and thence into shafts. The area of inlet into shafts is in all cases equal to the area of space within shaft.

TABLE NO. I.—TABLE OF CHEMICAL ANALYSES, ACTUAL VELOCITY OF AIR AND CUBIC FEET PER HOUR.

Number of room.	Exposure.	Cubic contents.	No. of pupils.	Cubic feet per capita.	Date.	CO ₂ per 1,000.	Temperature in room.	Temperature outside.	Temperature of warm air.	Outside humidity.	Room humidity.	Linear feet per minute at register.	Area of register.	Cubic feet per hour.	Cubic feet an hour per capita.	Comments.
<i>First floor.</i>																
No. II.	NW.	9,000	26	346	II, 23	{ (1) .55 (2) .45 }	{ 75° 74° }	Mild	...	...	...	...	...	...	...	{ Changes air in room every 12 minutes.
No. III.	N.	11,000	56	190+	III, 2	{ (1) .40 (2) .45 }	{ 74° 72° }	50°	111°	...	...	600 lin. ft.	2.5 sq. ft.	90,000	2,000	...
No. IV.	NE.	9,000	45	...	III, 8	{ (1) .19 (2) .56 }	{ 72° 70° }	58°	...	...	...	...	...	...	...	{ *Flasks filled near dinner, draught from register.
No. V.	SE.	9,000	43	200+	II, 24	{ (1) .37° (2) .50 }	{ 72° 70° }	30°	...	...	...	...	...	...	...	{ Only 35 present, and of these 17 had just entered.
<i>Second floor.</i>																
No. VI.	SW.	9,000	52	170+	II, 22	{ (1) .35 (2) .345 }	{ 70° 72° }	Mild	...	...	...	...	...	...	...	{ 74° at ceiling; 73° at floor.
No. IX.	N.	11,000	37	300—	II, 27	{ (1) .42 (2) .428 }	{ 70° 75° }	24°	111°	...	...	675 lin. ft.	2 sq. ft.	81,000	1,620	{ 73° at ceiling; 73° at floor.
No. IX.	N.	11,000	44	250	II, 28	{ (1) .42 (2) .428 }	{ 70° 75° }	3°	58°	...	...	290 lin. ft.	2 sq. ft.	34,800	870	{ School dismissed; fires quite low.
No. IX.	N.	11,000	50	...	III, 8	...	{ 70° 75° }	45°	...	...	...	...	...	...	...	{ Fires good.
No. X.	NE.	9,000	40	...	III, 8	...	{ 70° 75° }	45°	...	...	...	...	...	...	...	{ 43 CO ₂ per 1,000 av.
No. X.	NE.	9,000	40	...	III, 8	...	{ 70° 75° }	43°	...	...	...	...	...	...	...	{ 72.5° F. average tem.
<i>Tem. chamber.</i>																
Foul air chamber.	NW.	...	...	...	II, 26	{ (1) .17 (2) .35 }	{ 52° 61° }	45°	...	...	...	...	Area outlet.	...	...	{ School just dismissing. Hall door open.
Foul air chamber.	NE.	...	...	...	III, 8	...	{ 52° 61° }	58°	...	...	...	225 lin. ft.	6.5 sq. ft.	87,750	...	{ Notice Examined cubic feet in table below (3° dif. in tem.)
<i>Estimates made at different times, but tem. always low.</i>																
Air atmospheric.	...	...	...	...	II, 21	235	...	30°	...	...	...	...	...	...	...	{ Ordinary rooms with no systematic ventilation.
Air atmospheric.	...	...	...	...	II, 22	322	...	33°	...	...	...	...	...	...	...
Air atmospheric.	...	...	...	...	II, 21	31	...	33°	...	...	...	...	...	...	...
Air atmospheric.	...	...	...	...	III, 1	262	...	40°	...	...	...	...	...	...	...
Air atmospheric.	...	...	...	...	III, 1	262	...	40°	...	...	...	...	...	...	...
Fifth ward room.	SW.	15,000+	53	...	III, 3	.70	70°	40°	...	...	...	...	...	...	...
Audience room.	...	...	...	...	III, 6	1.875	70°	55°	...	...	...	...	...	...	...

METHOD USED IN CHEMICAL ANALYSES.

The process originally described by Pettenkofer, somewhat modified in detail, was followed. This method, carefully conducted, gives reliable results as far as the quantity of carbonic acid is concerned, but in instances where the amount is quite high, as before stated, the quantity of gas is an unreliable indicator. When the amount of carbonic acid does not exceed .8 parts per 1,000, it is probably a safe indicator of degree of vitiation. The air to be examined was collected in glass flasks, containing 19.73 and 19.12 liters. That from school-rooms was taken, in all instances, after at least three-quarters of an hour of continuous session. $\text{Ba}(\text{HO})_2 \cdot 40 \text{ C.C.}$, was exposed in each flask for one hour or more, frequently agitated. The alkalinity of the barium solution was previously determined by a solution of oxalic acid, 1.25 grams to the liter of distilled water. After exposure the alkalinity was again determined, the difference representing barium hydrate in union with carbonic acid, from which the amount of carbonic acid can be calculated. Rosolic acid was used as indicator. In every instance at least two titrations were made.

DESCRIPTION OF METHOD OF ESTIMATING VELOCITY AND VOLUME OF AIR.

The anemometer was used to determine the actual velocity at any point. An exposure of one-half to two minutes was given and linear feet read off from automatic register. Linear feet per minute, multiplied by area in square feet, gives cubic feet per minute. Humidity was determined by Mason's hygrometer.

The temperature of rooms was taken in several instances near floor and ceiling, and a variation not exceeding 3° was found. In one room, after exposure against ceiling and floor, the thermometers read 74° and 73° , and at same time the temperature taken within two feet of register was 74° , and on opposite side of room $74\frac{1}{4}^\circ$.

There are two methods of determining the working efficiency of any system of ventilation outside of chemical analyses. The one is the actual volume of air that enters the room each hour, and the other the volume of air that passes out during the specified time—condition of temperature not being taken into consideration. The latter is the most reliable, and few systems in operation will stand this crucial test. It is not a difficultly matter to force a large quantity of warm or hot air into a room, but to establish definite and uniform out-going currents should be the aim of every rational system, and to this end costly experiments and great mechanical skill have been devoted. We can scarcely hope to imitate nature in any degree except by such means. The atmosphere around us is never still, but its minimum rate of movement is one to one and a half miles each hour, and the average rate is about nine miles an hour. Hence we see that diffusion of gases is not the only factor in rendering pure the atmospheric air we breathe, but currents are always playing about us and bear away both the gaseous excreta and the more injurious organic matter in suspension. Especially is a mild current of air a necessity where individuals are habitually in close proximity to each other, as in the school room. By the active process of diffusion the carbonic acid may become equably distributed, even where the floor space allowed each individual is small, but the law of diffusion scarcely applies to the organic matter in suspension, and hence the necessity for currents of air that can always be relied on and are uniform in their effect over the whole room.

As a final and confirmatory test it was undertaken to determine the capacity of the ventilating shafts under varying circumstances. By the table II it will be seen that

the actual volume of air passing out of northeast shaft, as determined by anemometer, was 87,750 cubic feet each hour. This was under very unfavorable circumstances, since the temperature of air in rooms was only about 63° to 65° —school having dismissed—and consequently there was only a difference of about 3° between the temperature of air inside and outside of shafts. Using the formula of Montgolfier for calculating the quantity of air passing out of the shaft during a definite time, the height, area, and difference of temperature between air inside and outside of shaft being given, we get the following result: Shaft 62 feet by 8.33 square feet; difference in temperature 3° ; deducting 5-12 for friction; gives 83,952 cubic feet per hour. This is about 3,000 cubic feet less than the actual amount that would pass, under similar circumstances, as determined by anemometer, and warrants us in assuming that the estimates by the formula are not far from correct as applied in this case.

The temperature in shafts was determined by lowering a thermometer into two of the shafts (see Table II, 1 and 2), and on windward side of building was 44° at 6 feet and 52° at 70 feet from top of shaft—average 48° . There was a very strong northwest wind blowing and the temperature was 20° to 21° outside, making a difference of 27° on windward side and 30° in shafts on sheltered side of building. Twenty-seven degrees in sixty-two foot shafts would give a discharge of 258,400 cubic feet per hour, or 2,100 cubic feet for every 200 cubic feet of room-space ventilated by this shaft. Thirty degrees in the forty-eight foot shafts would give 289,300 cubic feet per hour, or 1,700 cubic feet for every 200 cubic feet of room-space ventilated.

The average temperature, for this region, for school months for 1883, was 43.8° . It is fair to assume that air in shafts can always be kept above 53.8° , and the minimum of difference in temperature between air in shafts and outside is thus 10° . An estimate based on this assumption would give a discharge of 156,800 cubic feet per hour from each of the sixty-two foot shafts and 137,500 cubic feet from each of the forty-eight foot shafts, making a total of 588,600 cubic feet per hour. This is about 1,300 cubic feet for each occupant of the building.

A system of ventilation that insures an out-going volume of air equal to 1,200 cubic feet per hour for each individual—and it should be borne in mind that many natural agencies are also at work aiding in purifying the air—diffusion, and the multitude of imperceptible currents that take advantage of the many small openings that exist in wood-work, and even through the porous brick walls—such a result is an achievement that is worthy of hearty endorsement, and it is to be hoped that the public will not be slow in appreciating its beneficial effects. This point once gained, ill-timed economy will not dictate in a matter of such vital importance, and the general question of ventilation—in audience rooms, school rooms, work shops and homes—will occupy its proper place among the great problems of every-day life that are the outgrowth of the demands of a progressive civilization.

Discussion.—Dr. McCurdy commended the paper. It was a difficult subject to handle. The Ruttan-Smead system, as described by Dr. Hubbard, was undoubtedly the best.

Dr. Miller remarked, it is impossible to bring more air into a room than is taken out. Foul air should be taken out near the floor. Ventilation is but dilution, and the air if removed rapidly does not have time to become very impure.

The next paper was announced as follows:

STANDARDS OF HEALTH.

BY G. C. ASHMUN, M. D., HEALTH OFFICER, CLEVELAND.

In all human affairs ideas precede action. The child in learning to walk has the wish, and the mental perception of walking, before the attempt is made. And in all progressive movements, moral, esthetic, or political, the conception of gain or improvement goes before the effort to secure. Thus in sanitary studies and efforts, the chief hindrance to a more rapid advance is the want of perception both of the need and the possibility of improvement. People remain satisfied with conditions, because the standard of health fixed in their minds is low, and not until some one shows a higher and better, do they realize how low it has been.

With the gathering of vital statistics, and the information thus obtained, come comparisons. The death-rate and birth-rate of towns, cities, districts, states and countries, are placed side by side, and from such comparison opinions and theories are formed of the causes and conditions leading to the differences shown. At present such statistics reach but little farther than to show the number and cause of deaths. But to the student this is far from satisfactory. He would like to know not only how many people had died in a given district during a year, but also how many were sick and in a condition of disability to support themselves or others,—an estimate of healthfulness based upon the condition of the living rather than upon those already dead. And even by an estimate based upon the number of deaths, the real question to be determined is, how many died from diseases which an intelligent care and watchfulness might have prevented?

A very common error in estimating the healthfulness of rural districts, arises from regarding the small number of deaths as the test, while almost every one may have been from a preventable disease. And the people in such districts often pass on from year to year permitting remediable conditions to do their fatal and disabling work, because they are satisfied that it is a healthy place, the deaths are so few! Whole communities have been sick with intermittent fever the greater part of the year, while the number of deaths would be so small as to show the place extremely healthy! No one would assume to fix the limit, or definitely state the results of preventive measures against disease. Efforts have been too much in the dark as yet, and too limited in their scope to demonstrate the possibilities. Certainly, the field is not limited to any class of diseases. For not only the germ and filth diseases, but the constitutional, developmental, local and violence classes, all furnish occasion and hope.

The ideal would, of course, be to have none die from any cause except "old age," and to have that cause advanced to the full one hundred years! But no one anticipates that human foresight or divine interposition will reach or control causes to such an extent at present. At the same time we should consider how clearly it has been shown in many times, places and ways that man is largely responsible for his own and his neighbor's physical well-being, and that by exercising the powers he has, the causes of disease and death can be largely controlled.

The fatalistic view that disease originates or is sent from some source outside the reach and control of man, whether that source be divine or satanic, is both ignorant

and unchristian. As also the teaching that care for the bodies of men is not essential, if only the souls are saved. People need to reflect that the body and soul go together in this life, at least, and are parts of a whole—that it takes both to make a decent and useful man, and any teaching which neglects either, injures both. Health of both, cleanliness of both, comes near divinity! The Yankee forefather had not much thought of the necessity or possibility of averting disease. *Work* was the “cure all,” and so long as *work* could be done indoors or out of-doors, he thought there was not much danger of dying. With conditions varying widely from those of their forefathers, his children find themselves forced to study health questions deeply, or see the stock extinguished from the land. For, with consumption and other lung diseases reaching into stores, factories and shops, where so many sons and daughters of the Yankee have found their work, comes the other startling defect shown in the birth returns. I am not so sure the descendants of the Yankees could have larger families by simply willing it. I fear the evil is deeper seated, and due to impaired vitality. But the standard has been low enough to, perhaps, account for much of the condition. A dangerous complacency has existed in this respect equal, at least, to that respecting disease. In Cleveland we have nearly twice as many births as deaths, —a very gratifying showing,—but when you search for nativities of parents, you find the poor Yankee falls far behind the German, Bohemian, Irishman, and other foreigners, in the reproductive scale. To produce fewer and better will not satisfy the demand, — *more* and *better*, should be the rallying cry.

The State and world are interested in what men can do for themselves and others. And conditions which impair the producing force of men are as of great importance to the State as are those which are more speedily fatal. For while a man is sick and alive, not only his own time and force are lost, but also that of those engaged in his care. How few persons realize the extent and reach of effects produced by a day's or week's sickness of one person? And how many are contented to expect to be sick? Without inquiring why or how their sickness was caused, or to inform themselves what precautions will enable them to avoid recurrence, they return to the same habits of life after each attack, and accept the results as a foregone conclusion in which they have no responsible part. This low standard of health in individual life, with its train of remedies rather than preventions, is the unit of measurement of appreciation of the subject in all our communities.

With habits of ill-health fixed upon fathers and mothers, the standard of health in family life is low. Children are allowed to expect to be sick! Every physician knows with what difficulty the invalid habit is overcome when once established. And when a family habit of sickness is established and accepted as a part of life to be borne, but not resisted or prevented, death is the only relief. Love of ease and self indulgence come and weaken will power to such an extent that people fairly enjoy the inactivity of sickness; and thus the American habit of easy dosing has come in to rule the people, instead of the rational and economic method of preserving, rather than restoring.

Take for example the mortality among young children—infants. About one-half of all the deaths in our cities are of children under five years of age, and one-third of children under one year! All of these children are made sick from the want of proper care, and the most of them from the want of care *not* attributable to ignorance or poverty, but from causes which are understood and neglected.

From individual and family life it is but a step to community life. And we cannot

might expect a higher standard for the community than that of its component parts. In health matters what is everybody's business is not done. And with a strong commercial interest always astir, ready to advance by every chance or channel, the thought of sickness or death is shut out, until it begins to affect trade! When that occurs it is surprising how important sanitary questions become. Often an epidemic of serious disease is required, causing not only loss of life, but finally affecting trade before some very open and long continued causes can be reached and removed. The estimate of a community is generally lower upon sanitary questions and measures, than that of the average citizen in such community, for the reason that there is ordinarily no general development or concentration of ideas upon such matters. Surely the standard of health is low in many communities, when conditions affecting the air, water, food, and houses of people are permitted to exist year after year with no thought or effort of improvement.

Among the obligations of individuals to each other and the community and State, none reach to a higher common interest than to matters affecting the lives and health of all. Each citizen owes every other and the whole community a support of every measure which will tend to keep all in self-supporting condition. He owes to the community a self-care and defence against disease which may make him a burden to the rest, or lessen his power of contributing to the common good. On the other hand, the community owe each individual member a protection in the enjoyment of his liberty, the use of his powers to labor, and to protect him from any injurious effect of the relation of community life. With such a view it becomes the duty of all organized communities to provide the methods and means to not only suppress and prevent nuisances, injurious or offensive, but to provide for the instruction of the people how to keep *well*, and in the best condition for their own and the common good. The enforcement of sanitary laws and ordinances finds its greatest warrant and results as a means of education. From some years of observation and effort, it is my settled conviction that permanent advancement in sanitary work is achieved only so far as the people in a community become educated to the necessity and possibility of better conditions and results. In rural districts, as in towns and cities, the apathy and want of interest is broken in upon only by some enforcement of law, which for the time excites great and general opposition, and whether conviction results or not, the educational effect is often pronounced and lasting. It is the quiescent tolerance of evils which have grown up with the community, which is hardest to reach and overturn. The time comes to every community when all that is worth saving in it turns on the question of health and physical condition. Fully five per cent. of all the men, women, and children of the State of Ohio, or any considerable community in the State, are constantly idle and unfitted for their own care by disease which may fairly be considered preventable.

It is not difficult to point out and attract attention to these low standards, which all, perhaps, would be ready to admit prevail, but remedies are called for. It is probably true that there is a limit, somewhat stable in its character, to the degree of health possible to each individual and community. This degree is rarely reached or maintained. But it is to reach as nearly to the possible in this respect that intelligent care in hygienic and sanitary matters is called for. They should be taught in every family, school and college. The importance, office, source of supply, and rational changes in the air, water, food, and temperature should be taught every child, and

with all to fix in the mind the principle that health is a natural right and state, and disease a sign of violated law. Often the home life and example must be counteracted by teaching in the public school, and the teachers themselves have to be taught. It would not be improper for the State Board of Health to ask that in the examinations of candidates for positions as teachers in our schools, questions upon hygiene should be included and have full weight in determining qualification. Here, also, should be a *bright* opportunity for the family physician, because freed from any sordid motive. He should be able and have heart enough to advise people how to live so that his services would never be required except at birth-days! Unfortunately, most physicians have been so exclusively occupied in searching for "curatives" and "restoratives" that their minds are not quite so ready with "preventives." The pulpit and press are powerful agencies for the enlightenment and stimulation of people on these subjects, and it often occurs to me that the clergy, to reach the souls of men, should preach health of body as an essential doctrine. It is a popular delusion that for every ill there is a physician and remedy. If there were, it is certainly better to so live as to need neither. If our civilization does not bring with it the discretion and habits of life to develope and maintain physical excellence, all other additions will but the sooner tend to destroy. However much arbitration may accomplish in the settlement of international questions or other difficulties, there will continue a demand for men and women of good mould, who can take care of themselves and their children; and it will not do to wait until epidemics and wars make known the fact that the "fittest" which have survived is altogether *unfit* for the demand of the time. "In time of peace prepare for war," finds a response, "In time of health prepare for disease." I do not propose to quote figures to prove theories or possibilities, but appeal to your minds and hearts to aid the era of higher appreciation of the possibilities in this field of work. Sanitary quackery and ignorance are not to be accepted as freely as quackery in medicine! Prove all things, but be sure what is held is good! The credulity of the day in regard to medicines is, I believe, in part due to the medical fraternity themselves. They have permitted people to demand and expect too much from remedies in the cure of disease, instead of plainly explaining the physiological processes by which health is maintained and restored when impaired. So in sanitary affairs, the plan must be to teach how to avoid causes of disease, rather than to wait until they have shown their nature and effects.

The next paper read was as follows:

DEFECTIVE EYE-SIGHT IN SCHOOL CHILDREN—ITS CAUSE AND REMEDY.

BY D. B. SMITH, A. M., M. D., PROFESSOR OF DISEASES OF THE EYE AND EAR, MEDICAL DEPARTMENT, WESTERN RESERVE UNIVERSITY.

Members of this Society, Ladies and Gentlemen:

The subject which I have the honor to present to you to-day is one of the most important which will engage the attention of this convention. The healthy eye is the source of more profound pleasure than any other organ of the body—I might almost say than all other organs. Certainly no part of the body is called into more constant use with the great majority, and yet how little attention we give our eyes unless they

become diseased. Tasks are imposed upon them that would completely crush any other organ, and still we go on day after day, never reflecting how miserable and dependent we should be if we lost our vision from any cause whatever, and especially so if lost from our own carelessness.

In the anatomy and physiology of the eye we have more to excite our enthusiasm than anywhere else in the organism. I never think of its delicate mechanism and its wonderful functions without being satisfied that the eye is more nearly an index of the mind than all other organs combined.

If we were intrusted with the care of anything half as valuable outside ourselves, how carefully and watchfully we would protect it from all harm. How much greater care and attention should we give our eyes to see that no harm befalls them, and how watchful we should be that nothing we do shall ever injure them. Realizing the importance of perfect vision so deeply, I will, I trust, be pardoned if, on some points, I should seem too radical, and I ask your earnest attention to a few matters that, in my opinion, are receiving too little consideration at the hands of those whose duty it is to instruct the young, and at the hands of those whose duty it is to provide the means for such instruction.

The young need not only proper instruction, but they need proper means and proper places in which to receive such instruction. If anything I may say will cause parents, teachers and students to place a greater value upon their eyes and to take greater pains not to permit injury to be brought upon them, I shall feel that much good has been accomplished.

I hope no one will think that I under-value the importance of a good education because I value good eyes and good health so highly. If one must sacrifice the latter in the effort to gain the former, I have no hesitation in saying that I believe good eyes and good health should come first. To me there is no sadder sight than that presented by a young man or woman who has completely broken down, either mentally or physically, through too constant or too severe application to study.

Teachers commend the burning of midnight oil too often for the best interests of their pupils' eyes and health. It is but natural that one should be filled with the importance of his life-work, and we can easily see how instructors may be led to place too great importance upon the particular branch they may have to teach, and therefore leave nothing undone to inspire in the pupil the same views of its importance which he himself holds. Long-continued familiarity with a subject may easily cause one to give lessons too long or too difficult without realizing the amount of work that will be required to master the lesson.

I have noticed repeatedly that the same teacher would impose, year by year, more and more work, until finally nearly the whole class would be unable to accomplish the task on account of the too great strain upon the eyes and health of the pupil.

Eyes are divided into four classes, according to their refractive peculiarities.

Emmetropic eyes, or those in which parallel rays of light are brought to a focus upon the retina.

Hyperopic eyes, or those in which parallel rays are not brought to a focus within the eye, but would be focused behind the retina if they were continued.

Myopic eyes, or those in which parallel rays are brought to a focus before they reach the retina.

Astigmatic eyes, or those in which parallel rays, entering the eye from different

parts of an object, are not all brought to a focus at the same point, either in front of, on, or behind the retina.

The first is called a normal eye.

In the second the eye-ball is too short.

In the third the eye-ball is too long.

In the fourth the eye-ball is not symmetrical in all meridians.

Only the third variety, or myopic eye, can be either congenital or acquired, and it is to this class of eyes we especially desire to call your attention. That myopia can be acquired during student life is clearly proven by the much larger number of eyes so affected among students, and the rapidly increasing per cent. of such eyes in the advanced years of student life.

Dr. Cohn, of Breslau; Dr. H. Derby, of Boston; Drs. Agnew, Noyes, Loring and Derby, of New York city; Drs. Williams and Ayers, of Cincinnati; Dr. Howe, of Buffalo; Dr. Richey, of Philadelphia, and many other excellent oculists, have examined over fifty thousand school children of various grades, and all agree that the number of myopes increases steadily with the years of school and student life.

These examinations have been most carefully made in all countries, and without a single exception prove that long continued use of the eyes at close work tends to develop myopia, and that this increases with the years of study.

In children under six years of age myopia is exceedingly rare, and in country schools it is also very rare, frequently amounting to but one per cent. These gentlemen have proved that from the age of seven to twelve myopia increases one per cent. a year. From twelve to fourteen at the rate of four and one-half per cent. a year. From fourteen to eighteen the rate of increase is still greater. In Cincinnati in district schools it was ten per cent. In intermediate schools fourteen per cent., and in high and normal schools sixteen per cent.

Dr. Yaeger, of Vienna, in 1861, found ninety myopes out of two hundred children in an orphan asylum, and in a private school eighty per cent.

In New York, the myopes were found fourteen per cent. Irish, twenty per cent. American, and twenty-four per cent. German.

Dr. Cohn examined the eyes of more than ten thousand school children of all grades, and found in country schools only one per cent. In elementary schools five to eleven per cent., in grammar schools twenty to forty per cent., in colleges thirty to thirty-five per cent. In the University of Tuebingen seventy-nine per cent. were myopic.

Of 9,096 German and Swiss college students the myopes increased regularly in the six years' course as follows: First year 22 per cent., second year 27 per cent., third year 33 per cent., fourth year 46 per cent., fifth year 52 per cent., sixth year 53 per cent.

The students in the various professions in Europe, presented myopes as follows: Law students 55 per cent., medical students 56 per cent., theological students 67 per cent., students in philosophy 63 per cent. Among colored children in New York City, many of whom had not been long in school, Dr. Callan found only two and six-tenths per cent. near-sighted.

In Harvard College, Dr. Derby found that the myopia increased year after year in the grades, and also that the same classes showed a marked increase as they passed from Freshmen to Sophomore, Sophomore to Junior, and Junior to Senior classes.

Dr. Cohn gives the results of his examinations in these words: "First—Short sightedness increases regularly with the increasing demands made upon the eyes, and reaches the highest point in college."

"Second—Short sighted scholars increase regularly in numbers from the lowest to the highest classes in all educational institutions."

"Third—The average degree increases from class to class; that is the near sightedness becomes more so."

While I believe there is often an hereditary tendency to myopia which allows the more easily its development, yet there is no doubt whatever that long continued use of the eyes at close range will produce it in those who are emmetropic or even hyperopic.

Dr. H. Derby says, "There is no doubt whatever but that study causes it." Dr. Howe says, "In school in which the hygienic condition relating to the position of the pupils and the amount of light are disregarded, the proportion of near sighted pupils grows larger, and conversely, where these relations are observed the number diminishes."

My own examination of over ten thousand children in the Cleveland public schools, in grades ranging from the D Primary to the High school, corroborates in every particular the findings and conclusions of other oculists. This condition of myopia is to be regretted for several reasons: First—This condition requires for distinct distant vision the wearing of suitable concave glasses—and glasses are always a source of annoyance, and in the high degrees no glass will properly correct the defect. I have examined eyes in which the far point of distinct vision is within an inch and a half of the eye. In such cases no complete correction of the myopia can be made.

Second—Myopic eyes are much more likely to give pain, as such eyes are not perfectly healthy eyes.

Third—The range of vision is necessarily impaired under the most favorable circumstances.

Fourth—The myopic eye is in constant danger of elongating beyond the limit of healthy internal coats, and finally causing, thereby, complete blindness from inflammation of internal coats of the eye.

Donders claims, "The near sighted person is not in a condition to discharge all civil duties; not only is he limited in the choice of his position in society, but in the higher degree near sight leads to disturbances of the power of vision and threatens its subject with incurable blindness."

With such an array of proof, we must admit that we cannot be too painstaking in doing all in our power to prevent the development of short sightedness, and when it has already developed we must reduce the work of the eyes until the myopia no longer shows a tendency to progress.

After fifteen years of age the danger of its development is largely diminished, and after twenty-four or five this danger is reduced almost to nothing.

Let us look for the causes of this myopia. The too early use of books is not to be recommended; children should be taught at first from the blackboard or from charts until their eyes have become accustomed to the shape of letters and figures. Writing or printing upon the blackboard should be sufficiently large to be seen easily from all parts of the school-room. Nothing is more injurious to the eyes than the constant squinting and straining in trying to decipher that which is entirely too small to be seen from a distance.

Children ought not to be sent to school too young, and especially is the sending of children at three and four years of age to the kindergartens to be discouraged. Too long continued use of the eyes at close work without rest should be avoided. The practice of reading in one position for hours is exceedingly trying to the eyes, hence the damage done by novel reading and needlework, or by any work that so absorbs the mind that no notice of time is taken. Our eyes should never be used when that use gives pain.

A correct position for writing, reading, drawing, etc., is very essential, and should command the most careful attention of the teacher. Too great bending of the head forward in study is very harmful, as it tends to congest the internal coats of the eye by obstructing the circulation through the head. This congestion tends to inflammation and softening of the coats of the eye, and renders the eye-ball more likely to become elongated by thinning of its external tunic, the sclerotic, and therefore not being able to resist the interocular pressure, the eye-ball gives way. This faulty position is particularly likely to be acquired during writing.

The habit of allowing children to almost lie down on their arms or desks when writing is most pernicious. Ink which is not easily seen when first used should be avoided. The school desks should be of proper size. The feet should reach the floor easily. The seat should be wide enough to support the thighs comfortably. The desks should not be too low, but should be high enough for the elbows to rest upon the top of the desk, while the back and shoulders are in the correct position. The top of the desk should project over the seat one or two inches, according to the size of the desk. The desk should slant twenty degrees for writing, and the book should slant forty degrees for reading. Children should be taught to look away from their books often in order to rest the eyes. They should be told not to read in street cars or railroad cars, as the printed page is too unsteady from the cars' motion.

The eyes should never be overtaxed during recovery from severe illness, especially after the eruptive fevers of childhood.

The book ought to be held well up, and about twelve inches or more from the eye. Continued looking at objects so near as to require decided convergence of the eye-balls, very frequently causes it to become oval instead of nearly spherical from muscular pressure, and may induce a decided giving way of the coats of the eye around the optic nerve entrance, known as staphyloma posticum. With this yielding of the eye-ball is frequently present extensive inflammation, which may end in hopeless blindness.

Myopia is incurable, and therefore it is the more necessary to use all possible means to prevent its development.

Writing is more conducive to myopia than any other use of the eyes, and yet the tendency of the methods of teaching in our graded schools is toward too much written work, and just in proportion to this increase in written work will be found the increase in short sightedness.

Educators should strive to eliminate from their course of study all useless and unnecessary work, and all work which while laborious to the pupil is really only so much waste of time because it takes time that could be spent to much greater advantage in some other way. Too much time is spent in memorizing lessons which will certainly be forgotten within the next few days. This is especially the case in history and geography.

The size of the type used in the printing of school-books is of the greatest importance, and a great many eyes are yearly injured because the type is too small to be seen easily. Dr. Cohn has given this matter the most careful attention, and thinks that the type used in printing school-books should be not less than one-seventeenth of an inch long, which is known to printers as Long Primer. And he thinks a still larger size would be more desirable, especially for the books of the lower grades. He says the interlinear space should be at least one-eighth of an inch usually, and never less than one-tenth of an inch under any circumstances. The type should be clear, and never less than one one-hundredth of an inch wide.

I have examined the type in a great number of school-books, and was surprised at the large number printed with type not at all suitable. In many instances where the body of the book is printed in type of proper size there are many foot-notes and explanatory notes in type wholly unfit on account of small size. The use of type altogether too small seems to be almost universal in the printing on maps, and in some instances I found the type to measure less than one thirty-fifth of an inch. On most maps there is decidedly too much printing which necessitates looking for too long a time on the part of the pupil to find the location of places. This is especially the case in many of the geographies designed for the use of the lower grades.

The study of geography, in my opinion, does more injury to the eyes than any other study in our public schools. What earthly use is it to oblige pupils to spend months in order to become familiar with the small towns, rivers, etc., in Central Asia, in Africa, in Australia, and other countries where this knowledge is of no practical value, even if remembered, and in fact is almost never remembered beyond the current recitation. To compel our eyes to do such a vast amount of useless work as is done in some of our schools is the greatest folly.

The eye will often bear the greatest abuse without giving any warning that it is over-worked, and then all at once give out so completely that it may require months of care and skillful treatment in order to bring it back to a normal condition. Good light in sufficient quantity and quality is also essential to the proper use of the eyes. The bad effect upon the eye of reading or studying by improper or insufficient light is almost immediately noticed. Those who have examined the eyes of school children all agree that this is one of the most frequent causes of defective sight, and that many eyes that would withstand much other abuse will give out when the light is bad. The light should come from both the left side and the rear of the school-room, and the window space should be to the floor space in the proportion of one to four at the very least calculation. The teacher should see that the curtains are not too high on a light day or too low on a dark day, as either extreme is trying to the eyes.

Children should not be allowed to read with the sunlight falling directly upon the book; neither should they be allowed to read by twilight. In studying by artificial light care should be taken that the light is neither deficient in quantity or quality, and that it is not unsteady. A blue chimney to the lamp will often prove a source of great relief to the eyes of the student. Yellow light is not desirable. The eyes should be protected from the light of the lamp either by a suitable shade or the position of the lamp.

Many unfavorable conditions are more likely to be present in the home of the pupil than in the school; hence the necessity of educating parents as well as teachers and

pupils. Whenever any error of refraction exists it should be corrected at once and properly fitted glasses should be worn. Many scholars are required to do too great an amount of work outside of the school-room, either as extra work given by the teacher or desired by the parent.

Dr. Landolt says such work ought not to take the time of the child more than one-fifth of the time of school hours before thirteen years of age, and not more than one-third of the time of school hours after that age. If this rule be correct, and I have not the least doubt of it, we all know how often it is violated. I have long been of the opinion that if the teacher desired to teach something outside of the regular course of study he should do it by means of lectures, and quizzes upon the lecture, instead of asking the children to look it up for themselves.

The regularly prescribed course of study is, nine times out of ten, as much as ought to be required of the child, without anything being added to it, and fully as much as the eyes of the pupil will bear. Thousands of eyes are injured from over-work which do not develope myopia, but some form of functional asthenopia, tiring of the muscles of accommodation and convergence, congestion of the retina, and other difficulties. In myopia external squint is often developed by the relaxing convergence of one eye. In hyperopia internal squint is developed from the necessity of over-convergence in order to get efficient accommodation, as these two go together. Long-continued squint causes impaired vision, or even total loss of vision, through want of use of the squinting eye, which adds still another reason for correcting the refraction of the eye.

In view of what has been said, is it not our duty to do all we can as individual members of this sanitary society to correct this tendency to the abuse of the eyes? Let us take this matter in hand with a determination to remedy it as far as possible, and we shall be able to do an immense amount of good to hundreds who would otherwise have their lives greatly impaired for future usefulness on account of defective sight and health.

Discussion.—Dr. Miller said it was becoming a question with many as to how much brains are worth—whether the education received is worth the physical sacrifice entailed.

Dr. Smith had given a liberal allowance of window space, but teachers controlled this, often to the pupils' detriment. Insufficient light was a prolific source of bad sight.

Professor McMillan said the healthiest and best looking children in Youngstown were found in the schools.

Dr. Hole said the problem for educators was to provide for the development of the body while the mind was being trained.

The first paper of the afternoon session was on

THE PROTECTIVE POWER OF VACCINATION.

BY DR. S. P. WISE, MEMBER OF THE STATE BOARD OF HEALTH, MILLERSBURG.

The greatest discovery in relation to disease ever made by mankind for the preservation of human life and the relief of human suffering, was the discovery of vaccination by Dr. Jenner. Most all inventions and discoveries in the various departments of

science, philosophy and mechanics were at first rude and imperfect, and required years of experimentation and research by master minds to bring them to a state of perfection and practicability. Not thus, however, with this invaluable preventive for the most dreaded and loathsome of all diseases. Jenner not only discovered it, but he also proved its truth and demonstrated its value to the world, so that the rational and perfect practice of vaccination can be said to have sprung directly from his hands. Moreover, it may be safely asserted that, had this procedure always been as carefully and thoroughly practiced in all its details as first taught and promulgated by its originator, small-pox would at present be almost unknown, if not entirely eradicated. A brief sketch of this illustrious man in connection with the peculiar circumstances which led to this wonderful discovery may be of interest.

He was a youth pursuing his studies at Sodbury, England, when his attention was arrested by the casual observation made by a country girl who came to his master's shop for advice. Small-pox was mentioned, when the girl said: "I can't take that disease, for I have had cow-pox." The remark immediately riveted Jenner's attention, and he forthwith set about inquiring and making observations on the subject. His professional friends to whom he mentioned his views as to the prophylactic virtues of cow-pox, laughed at him, and even threatened to expel him from their society if he persisted in harrassing them with the subject. In London he was so fortunate as to study under the celebrated John Hunter, to whom he communicated his views. The advice of the great anatomist was thoroughly characteristic: "Don't think, but try; be patient, be accurate." Jenner's courage was greatly supported by the advice which conveyed to him the true art of philosophical investigation. He went back to the country to practice his profession and carefully to make observations and experiments, which he continued to pursue for a period of twenty years. His faith in his discovery was so implicit that he vaccinated his own son on three different occasions. At length he published his views in a quarto of about seventy pages, in which he gave the details of twenty-three cases of successful vaccination of individuals to whom it was found afterwards impossible to communicate small-pox, either by contagion or inoculation. It was in 1798 that this treatise was published, though he had been working out his ideas since 1775, when they began to assume a definite form.

His discovery was received, first with indifference, then with active hostility. He proceeded to London to exhibit to the profession the process of vaccination and its successful results; but not a single doctor could he get to make a trial of it, and after fruitlessly waiting for nearly three months Jenner returned to his native village. He was even caricatured and abused for his attempt to "bestialize his species by the introduction into their systems of diseased matter from the cow's udder." Vaccination was denounced from the pulpit as diabolical. It was averred that vaccinated children became "ox-faced," that abscesses broke out to "indicate sprouting horns," and that the countenance was gradually transmuted into the visage of a cow and the voice into the bellowing of bulls. Vaccination, however, was a truth, and, notwithstanding the violence of the opposition, belief in it spread, though slowly. In one village where a gentleman tried to introduce the practice the first persons who permitted themselves to be vaccinated were absolutely pelted and driven into their houses if they appeared out of doors. Two ladies of title—Lady Dulcie and the Countess of Berkeley—to their honor be it remembered—had the courage to vaccinate their own children, and the prejudices of the day were at once broken through. Jenner's cause

at last triumphed and he was publicly honored and rewarded, while the practice of vaccination was adopted all over the civilized world. Cuvier has truthfully said: "If vaccine were the only discovery of the epoch it would serve to render it illustrious forever."

That vaccination undoubtedly is an almost absolute preventive of smallpox is abundantly proven by statistical evidence. Nothing is certain in this world, but next to the rising of the sun, nothing is more absolutely certain than the fact that thorough vaccination with reliable lymph, repeated with sufficient frequency is a sure protection. The protection which it is capable of affording is exactly that which an attack of smallpox is well-known to confer. In other words, by means of this simple procedure we substitute a mild affection of only a few days duration; never causing death, suffering or disfigurement when properly and intelligently performed, and conferring a perfect immunity from the graver disease. The most conclusive evidence in support of the efficacy of vaccination can be deduced from a comparison of the prevalence and mortality of smallpox prior to its introduction, with the limited prevalence and fatality since that period.

History informs us that prior to the nineteenth century smallpox long constituted one of the greatest scourges of mankind. Not a decade passed in which the disease did not decimate the inhabitants in one country or other, or over great tracts of country. In England, in the seventeenth and eighteenth centuries, ten per cent. of all the deaths were attributable to this disease. In Berlin, from 1783 to 1797, one-twelfth of the total mortality was due to the same. In 1796, among the 700,000 inhabitants of Prussia, 26,646 died of this disease. In the eighteenth century 30,000 died, annually, of smallpox in France. As to the sum total of deaths from this cause, Macaulay says, "that during the century previous to the discovery of vaccination, smallpox is calculated to have destroyed forty-five millions of the people of Europe." The ravages of this disease were not confined to Europe alone, but other less civilized countries were more severely afflicted. Mr. Prescott speaks of an epidemic in Mexico as "sweeping over the land like a fire over the prairies, smiting down prince and peasant, and leaving its pathstrewn with the dead bodies of the natives who perished in heaps like cattle stricken with the murrain." It is also estimated that six millions of the North American Indians fell victims to this disease.

This "most terrible of all the ministers of death" as Macaulay calls it, is no respecter of persons. In England it disfigured William III for life, and killed his wife Mary. It also killed Joseph the First of Austria, Louis XIV of France, Peter the Second, Emperor of Russia, and Eleonora, Queen of Sweden. In reference to the disfigured faces to be seen in those days, a writer says, "If a modern traveler could find himself transported to the streets of the city of London as they appeared in the early part of the present century, it is probable that no peculiarity of architecture, dress or behavior would be to him so strikingly conspicuous as the numerous number of pock-marked visages he would encounter among the people at every turn." The universal prevalence and resignation to the ravages of this disease during the middle ages, is evinced by a proverb of the times, "From smallpox and love few remain free." In view of the appalling history of smallpox before the discovery of vaccination, it would seem unnecessary to cite proof of the fact that there is an immense reduction in the mortality from this cause during the present century, as any one will know who has the slightest knowledge of the prevalence of disease. A few

illustrations will therefore be sufficient. After the introduction of vaccination into Sweden the annual death-rate from smallpox fell from 1,973 to 180 per million. In the German army during the Franco-Prussian war, all soldiers entering the army had to be revaccinated, and there were only 263 deaths from small-pox; in the French army this was not required and there were 23,368 fatal cases of this disease.

The protective influence of successful vaccination is also fully substantiated by all earnest and accurate observers who have had extensive experience in the management of smallpox hospitals. Mr. Marson, of England, who has had charge of a smallpox hospital for a period of thirty years, and during that time had 1,000 cases under his personal care, and has carefully recorded all particulars respecting them, has found that while the unvaccinated have died at the rate of thirty-five per cent. the vaccinated died only at the rate of six per cent. Drs. Seaton and Buchannon examined upwards of fifty thousand children in the schools and work-houses in London during the epidemic of 1853. They found that of every thousand children without any mark of vaccination 30 had marks of smallpox; while of every thousand children who had evidences of vaccination only 1.7 had any such traces. It must be noted that the 360 per thousand who presented evidences of having had smallpox *represented only* the recovered cases, the number of deaths being unknown and hence could not be taken into account. Furthermore, statistics unless embracing a large number of cases are liable to be inaccurate, and it is quite evident that whatever error there might be would be in favor of the vaccinated, for the simple reason that observers have no other evidence than the character and quality of the cicatrices upon which they can base their conclusions, and can by no means vouch for the thoroughness and efficiency of the vaccination. It would therefore be reasonable to conclude that a part, at least, of the six per cent. given by Marson, who bore the scars of vaccination, and nevertheless died of smallpox, were unsuccessful or spurious forms of vaccination.

The most striking illustrations of the effects of vaccination can be obtained from private sources. The result of such an inquiry made by Mr. Cross, of England, was, that of 215 unprotected members of families so circumstanced, 200 contracted the disease and 41 died; while of the vaccinated only 1 took the disease, and these both had it in the modified form. An example of recent date is given by Rev. Abbe Decarie from the municipality of St. Henri, near Montreal, which city and vicinity was terribly scourged by small-pox in 1885. Out of 233 cases given by this observer, 115 were unvaccinated, every one of which died, and, with the exception of two cases, not one child in St. Henri which had been successfully vaccinated took small-pox.

That vaccination can be made wholly protective and small-pox could be entirely eradicated is demonstrated by the fact that for over thirty years all the nurses and servants have been revaccinated on their coming to live in a small-pox hospital, and not one of them has contracted the disease during their stay. This perfect immunity has also been observed in the German armies, where vaccination has been perseveringly practiced. From the foregoing facts it is, therefore, evident that the degree of modifying power of vaccination over small-pox is in the exact ratio of the excellence and completeness with which it is performed. Even Jenner realized this fact, and in his writings lays great stress upon the necessity of performing this operation carefully and thoroughly, and insists that it must be thus done in order to be of any positive value as a protection.

While we fully recognize the beneficial results of this sanitary measure, and its effi-

ciency is incontestibly proven, yet we must admit the deplorable fact that the number of cases of small-pox occurring per million persons is very much greater than it was in the earlier part of this century, and epidemics of this disease are becoming more frequent and more formidable than they were a quarter of a century ago. Why this should be so is easily understood when we for a moment consider what the causes are that lead to outbreaks of small-pox, viz.: first, the accumulation of a sufficient number of unprotected individuals; and second, the access of contagion to such individuals. By reference to the excellent report of the Illinois State Board of Health for 1883 we find that the school population numbered 713,411 enrolled scholars, out of which 490,000 children, or nearly 69 per cent., were unprotected by vaccination. Of the remaining population, embracing nearly two and one-half million souls, over 21 per cent., or 530,000, were unprotected, and consequently susceptible to small-pox, making an aggregate of over one million individuals in the State susceptible to the contagion of this disease. The result was that in 1882 the State was visited by an epidemic, or rather a series of outbreaks, by which hundreds of lives were lost, and the money expended in consequence thereof amounted to \$1,403,968.43. Unfortunately the State of Ohio has no statistics from which its condition in this regard can be ascertained. Perhaps "where ignorance is bliss 'tis folly to be wise," yet we have every reason to believe that our State is fully as unprotected, if not more so, as Illinois was in 1882, and that there are at present within its borders at least one million persons who are susceptible to this contagion. That this estimate falls far below the exact number is highly probable, for the reason that our State has enjoyed almost an absolute immunity from this disease for a long period of years, and the people have lapsed into a blissful state of imaginary security, which invariably engenders a reckless disregard for all precautionary measures. In regard to the communication of the contagion, it is self-evident that in these days of rapid transit, and increased facilities for transportation and immense influx of immigration, the contagion may be very easily introduced and spread throughout our country and give rise to extensive outbreaks, especially where the population is largely unprotected. That foreign immigration is the usual source of contagion, and is the prime factor in the continuance of small-pox in the United States, is clearly shown by the following proposition formulated by the Illinois Board of Health: "The greater or lesser prevalence of small-pox in this country corresponds closely with the greater or lesser number of immigrants received and with the existence of small-pox in the countries from which such immigrants come."

This coincidence is also plainly shown in a table of small-pox mortality in Chicago covering a period of nearly one century. This table elicits the fact that small-pox has reappeared in the city of Chicago at nineteen different times after periods of entire freedom from the disease, and in fourteen of these reappearances it is positively known to have been introduced by immigrants, and to have spread directly among and from them. In the large cities of Europe small-pox is seldom at any time entirely extinguished. Isolated cases are almost constantly observed there among the lower classes; and if we take into consideration the extreme subtlety of the contagion, its tenacity in clinging to clothing and other transportable articles, its great permanency and indestructibility, it is not in the least surprising that it should be perpetuated, and, like a lingering, slumbering fire, burst forth in mighty flames from time to time under a combination of favorable circumstances. Internal quarantine has accomplished a

great deal in preventing the spread of this disease, and its measures are usually very rigidly enforced and complied with. Yet the isolation of the patient and the most complete interruption of all communication would never restrict the disease were, it not for the universal and imperative demand for vaccination which an outbreak occasions, and the promptitude with which it is practiced. This fact is fully corroborated by the experience of all observers wherever small-pox has occurred. When once the disease has manifested itself in a town or neighborhood there is usually no difficulty in the enforcement of quarantine regulations nor in the practice of vaccination. People have a profound reverence for a small-pox flag, and give it as wide a berth as though it marked the headquarters of the proprietor of the infernal regions. If the fact is announced that a patient is having small-pox, the balance of the inmates of that dwelling are suddenly struck by the recollection that they have urgent business elsewhere and hasten to attend to it with commendable celerity. It is even said that the most implacable collector, with iron cheek and unmitigated gall, will display the most magnanimous attributes of his soul by granting indefinite days of grace, should he, on entering his victim's room, behold the horrifying pustules.

Owing to the panic the appearance of small-pox creates, and the consequent prompt observance of preventive measures, the disease is often confined to narrow limits. Yet, in spite of all that can be accomplished by these means, the contagion has frequently gained such an extensive foothold as to give rise to epidemics of vast proportions, as was the case in Montreal a few years ago.

The conclusion is, therefore, forced upon us that our only and true palladium of safety consists in vaccination and revaccination, thoroughly and efficiently performed. It is, also, obvious that delay is dangerous. Forewarned, forearmed. The time to prepare for war is in time of peace. It is, and always has been, a characteristic trait of mankind to neglect important duties, and to procrastinate in the fulfillment of them so long as danger is not positively imminent. It is this self-same neglect which has precipitated thousands of disasters and casualties upon the human family, and caused the destruction of untold numbers of precious lives. This applies no less to the spread of contagious diseases than to the active operations in which men are engaged. The question of vaccination solves itself, not into a matter of expediency or propriety only, but it presents itself to us forcibly as an imperative and absolute duty. It is a duty we owe to ourselves and our children, to the community in which we live, to the State and to the Nation. It is not only necessary that we avail ourselves of this sanitary precaution as a protection to ourselves but it is a moral obligation we owe to others whose lives we have no right to jeopardize. Your drinking water may become polluted or the germs of disease may insiduously invade your dwelling by reason of an unsanitary condition of your premises and prostrate you with disease; and you may not be culpable, for the reason that you are not sufficiently informed on the subject of sanitation to avert it, and hence are not responsible for its occurrence. If, however, you or your family has small-pox, you *are* responsible, and you may blame yourself. If a community has small-pox it may blame itself. It is said that a man looks after his own interests, takes care first of his horse, second of his dog, third of his sheep or hog or ox, fourth of his children, and fifth of his wife. There is, no doubt, a great deal of truth in this statement, and if this order were reversed we would have a better and happier state of affairs, and there would be no obstacle in the way of practical sanitation. If self-protection is the first law of nature, unques-

tionably in vaccination you get self-protection in the fullest sense of the word. You neglect it at your own peril. Your life may be blighted by your failure, your hearthstone despoiled, and your home made desolate. What parents would not feel the pangs of ruthless remorse were they to behold the pustuled body of their child wrapped in the cold arms of death, or, should it be spared, living hideously disfigured for life, conscious of the fact, as they would be, that such cruel fate might have been avoided by a simple, harmless expedient, which is within reach of every one who desires to avail himself of it?

In regard to the *modus operandi*, age, time, season, individual conditions, etc., which should govern the operation, I would simply impress upon you that it is by no means as trivial and unimportant as it would appear to the ordinary observer; and that there are numerous conditions and adventitious circumstances which have a direct bearing upon its success, which can be determined only by the scientific physician. Hence it is highly important that you should be vaccinated by a competent physician who is thoroughly qualified to recognize and appreciate those essential conditions, and by close observation is able to decide as to whether the result is fully protection or not.

In conclusion, I regret to say that the neglect into which the practice of vaccination has fallen, and the loss of faith in its protective power, is largely due to the culpable neglect of the essentials of the operation, for which the medical profession and medical teachers are responsible. The late Dr. Martin, who devoted a life-time to the subject, said, "My belief has very long been that in no country has vaccination been carried on less satisfactorily than in the United States. * * * When we reflect that even in our most pretentious medical colleges vaccination was not, till lately, thought worth teaching, and the protection of the people had to be done by men who had never even learned what a perfect vaccine vesicle was, it is hardly to be wondered that vaccination in America has been done very badly." The testimony of the late epidemic in Illinois fully corroborates this statement. Dr. Rauch, Secretary of the State Board of Health, says, "It was a notorious fact that many otherwise competent and successful physicians were practically ignorant of many of the important details of vaccination."

One of the results of this incompetency is that it degrades the operation in the eyes of the laity. "If the physician himself will vaccinate any individual without proper examination as to fitness or physical condition; merely scarifying the skin and rubbing in the virus and then turning the patient away with no after-care or examination, it is not to be wondered at that parents, druggists, barbers, midwives and old women of both sexes consider themselves competent to perform the operation." Another result is that the vast majority of persons who are thus improperly vaccinated regard themselves as fully protected, and when an outbreak of smallpox occurs, and many of them take the disease—as was the case in Illinois—the conclusion is formed that the great discovery of Jenner has lost its power, and there is a consequent loss of faith in the procedure which is seemingly justifiable. It is therefore the duty of medical preceptors and teachers to instruct their students in all the practical details of the operation and invest it with the importance and dignity to which the value of its results entitles it. It is also plainly the duty of every medical practitioner, not only to inform himself upon the subject thoroughly so that he can perform it skillfully and recognize its characteristic phenomena, but also to disseminate such secular knowledge concerning its importance as will restore it to the confidence of the public.

The end at which we aim as medical men, in a spirit of true philanthropy, is freedom from disease and a longer life. We are the custodians of the lives, health, and to a large extent the prosperity of the people; and if we fail to instruct them in matters pertaining to the preservation of health and prevention disease, we are criminally negligent. Medicine has achieved greater renown in the prevention than in the cure of disease, and therein lies its future glory.

Prof. E. F. Moulton, of Warren, presented the following report on

THE SANITARY CONDITION OF COUNTY INFIRMARY, JAIL, AND COURT HOUSE OF TRUMBULL COUNTY.

March 12th, Captain J. L. Smith and myself visited the county infirmary for the purpose of investigating its sanitary condition. We first entered the basement of the building. Here we found the steam pipes leaking, both water and steam, to such an extent that the bottom of the cellar was covered with water, and the walls and ceiling were dripping. Some parts of the cellar contained vegetables of different kinds; these added to the unhealthy conditions of the general dampness. The drainage seemed inadequate to carry off the water discharged from the pipes.

In the eastern part of the basement are located the boilers for heating purposes. In this apartment there was less water, but a very decided manifestation of escaping sewer gas. In fact, the entire basement was one of those disease-breeding cellars, of which Dr. Johnson has told you. It seems to us that the entire system of returns in the steam heating apparatus should be changed at an early date. In many apartments of the cellar there was no means of ventilation whatever. In others there were small windows, which could not be opened, except, perhaps, in the coldest weather.

The water closets on the outside of the building were in fair condition. Under one of them is quite a stream of flowing water, which carries off all refuse matter. The other is not so favorably located, and is not without unpleasant odors. Suitable boxes, with plenty of dry earth, would remedy this. The bath-house and wash-room are not sufficiently furnished with tubs, nor sufficiently protected from outside observers. The east end of the building is devoted to the insane or imbecile. The female ward is located on the second floor, and the male on the first, directly beneath.

The halls are about ten feet wide, and run the entire length of these wards, with rooms on each side. These rooms are seven and eight feet wide, and ten feet high. There is one window, one bed, and one chair, in most of these rooms; in some there are two beds. These rooms are occupied by two persons, and in some cases by three. In every room there is a water closet, without any adequate water supply to keep the bowls clean. The soil pipes of the upper rooms pass through the lower. In one corner of each room there is a small ventilating shaft, perforated near the floor. These are not heated; hence do not carry off the foul air generated in each room, as they might if heated. The opportunity for admitting fresh air is lacking altogether. The windows are protected from the inside by a heavy wire grating, so that they cannot be raised to admit fresh air. The rooms occupied by the sane are larger and more comfortable. There are sixty-three rooms in the building, and sometimes one hundred and forty inmates. One hundred and ten persons only can be comfortably

and healthfully accommodated, even if the conditions of health were favorable. There are at present seventy-three inmates, of whom fifty-three are insane or imbecile. There are accommodations for only forty-five insane patients. This department is overcrowded. There is no hospital for the sick. If an epidemic should break out, all the inmates would be exposed. To establish proper sanitary conditions at the infirmary, many changes in the old building would be necessary, and a new building for the women, well ventilated, well heated, with rooms of suitable size and comfort, should be erected. We hear that the Commissioners have such a building under consideration. The barn located near the dwelling, too near for health, should be removed. We are glad to be able to say that the building is kept clean by the Superintendent and his wife, and, so far as we were able to see, everything is done by them for the comfort of the inmates that is possible under the circumstances. The unfavorable sanitary condition of the place is no fault of theirs or of others in authority, but largely grows out of a lack of modern improvements and modern methods of ventilation and proper drainage, together with an inadequate supply of water in the building.

JAIL.

On the 26th inst. we visited the jail and court-house. The jail is a comparatively modern building, with proper facilities for ventilation. In that portion of the jail occupied by prisoners there are two halls, thirty feet long, seven and one-fourth feet wide, and ten feet high. On one side of these halls are windows, which afford plenty of light. On the other side are the cell-rooms, seven feet wide, ten feet long, and nine feet high. There are comfortable cots in each cell. The cells have two ventilating flues, one near the floor and the other near the ceiling. The halls are also well ventilated, with large openings in each, with ventilating shafts running through them. These shafts are well heated, and there is a strong draft carrying off the foul air.

The doors of the cells are made of iron grating, opening into these halls. This gives the prisoners the benefit of the ventilation of the halls during the night, and we think they have the freedom of the halls during the day. Instead of a water-closet in each room, as at the infirmary, it is placed in a room apart from the others. This is in very good condition. There is a large dining-hall in front and center, sixteen feet wide, thirty feet long, and twenty feet high. This reaches in height through both stories of the building, and the halls before described open into it, with grating doors. The building is well heated with steam. The pipes are in good order, and there is no dampness in the upper and occupied part of the building. In two or three of the rooms, notably the large room called the hospital, there is an evident odor of sewer gas. In the basement the washing apartment, the water-closets and other rooms are in good condition. Here some of the drains leading to the main drain in the building were obstructed, and in some places overflowing. We learned from the Warden that this was temporary, and of late occurrence. A general cleanliness was observable everywhere. We are happy to state that the general sanitary condition of our county jail is good, and in our opinion much better than are found in the average institutions of this kind. Evidently our criminal classes are more comfortable and better protected from diseases of all kind than are our county poor.

COURT HOUSE.

There is but one nuisance in the court-house, and that is a fearful one. I refer to the public water-closets, located in the southwestern corner of the building. We are told that on certain days the odors reach to every room in the building; especially to those rooms situated in the south end of the building on the first and second floors. The probable reasons for this state of things are the lack of sufficient water to carry off the deposits, and the lack of capacity in the drainage pipes. We judge the size and number of the closets are not sufficient for the general and constant use to which they are subject. It is possible that an ample supply of water may remedy the evil. This we shall soon have from our new water-works. It is possible that it may be necessary to remove these closets from the building. Something should be done, and done speedily, to renovate or abolish this court-house plague. The court-house has of late been remodeled, and many modern improvements, such as new methods of heating and ventilation, etc., have been added. All the rooms in the building are high and commodious. This is the best ventilated building we visited. There is an opening through the wall from the outside behind each radiator sufficient to admit an abundance of fresh air. There is a grate for an open fire in each room, to carry off the foul air, and registers connected with ventilating flues near the top of the rooms. The system of heating by steam and open fires in grates, as well as the system of ventilation, is, in our opinion, the best in use. The offices are receiving fresh paint and paper, and are in every way a pleasure to look upon, and very comfortable. We are glad to say that the county officials are better cared for, more pleasantly situated, and more comfortable, than either of the classes to which we have previously referred.

The time has come when people are more and more interested in securing the best sanitary conditions for their homes and for all public buildings. This is a hopeful sign of the times, and we see in it better health, increased longevity, and a more advanced civilization.

Respectfully submitted.

J. L. SMITH,
E. F. MOULTON,
Committee.

Discussion.—Dr. Beckwith stated that Dr. Miller had made an early morning visit to the Infirmary, and called on him to report.

Dr. Miller said he had found the institution in bad condition. The heating arrangements were all wrong. Water closets were found in some of the sleeping rooms, and ventilation not provided. No blame was to be attached to those in charge, as the best was done that could be under the circumstances.

Hon. L. D. Thoman, of Youngstown, gave an interesting talk on the "Laws of Ohio Relating to the Public Health." He thought taxation afforded a basis for securing better health laws, and that the levy for street cleaning and sanitary purposes should be entirely separate, as by far the greater portion of it now was spent on the streets. He thought the sanitary fund should be at the disposal of the Board of Health, and the Board entirely divorced from politics. He stated that more law was not needed, but a better enforcement of

existing laws. He referred especially to sections 2133 and 2134 of the Revised Statutes regarding the inspection of meat and milk, showing the great importance of such inspection. The expense of constructing sewers, he thought, should be paid from the general fund, so that all parts of a city could be properly sewered.

After Judge Thoman's address the last paper to be read before the Convention was presented by Rev. J. W. Campbell, of Warren, entitled

VENTILATION OF CHURCHES.

BY REV. J. W. CAMPBELL, OF WARREN.

Mr. President, Ladies and Gentlemen :

Your committee, who arranged for the programme of this Convention, invited me to read a paper on Ventilation of Churches.

I think myself happy, gentlemen of the healing art, that I am permitted to speak for myself this day before you touching the things whereof we are accused, especially because I know you to be expert in all customs and questions which are among us ; wherefore I beseech you to hear me patiently.

There have been numerous lectures given and books written upon the subject of ventilation, and yet we doubt whether there is a subject so vitally connected with health and happiness which is so little understood. The fact that our churches are built with every modern convenience from kitchen to organ-loft, and many finished at great expense from the people's money, should lead us to look to the comfort and health of those who congregate for worship. A well-formed pew and elastic cushion, stained glass windows and frescoed walls, are not sufficient for those who assemble. That other fact, that the church is built for worship, should cause us to not only make it attractive to the eye, but healthful and refreshing to the body ; and the command, "Thou shalt not kill," is just as binding upon *us* as it was upon the church of Moses.

The minister may be a man of modern type, and he may grow eloquent in holy language, but a seraph could not counteract the poisonous gasses in their stupefying effects upon a congregation when the house is not provided with foul-air escapes. Here and there, all over the audience, one after another falls under the effects of inhaled carbonic acid gas. The minister is embarrassed and he beats the air—no, the air beats him—and he goes home a defeated ambassador of the Lord Jesus. The only redeeming part to that service was when the people made their escape from this devil of noxious gas out into God's real house.

The minister now gets a reputation for being prosy. How could he be otherwise ? The people who fall asleep first are among the first to invite the reverend gentleman to resign. The most important and blessed minister needed for that people is "fresh air."

We are compelled to say that comparatively few of our churches are ventilated. I presume to say that I am permitted to preach in as well a ventilated church as we have in this city, and that church has no ventilation that is worthy the name. "The blood (says one) is the life," and the blood will become corrupt in an unventilated church and in the presence of the Ten Commandments and our altars as readily as in an unventilated garret or cellar. The blood from the lungs is carried through the

whole body in its natural course. It runs red, it leaps, it bounds, it pours along, dividing and subdividing, until it forms the capillary circulation in the skin, where the little hair-like tubes are so numerous that you cannot introduce the point of a cambric needle without wounding them. From these small vessels the blood is conducted into the veins after it has accomplished its mission in rebuilding the wasted parts of the body. The blood returns at a sluggish pace to the lungs. It is laden with impurities, and goes back black to the lungs for fresh air. If, upon its return, it is greeted with oxygen it will assume its reddened hue once more. The impurities are discharged. The carbonic acid gas is thrown off, and the blood again flows on in its circuitous route with health and life for the body. This discharge of impurities and deadly poison goes on in a church whether it is hot or cold, open or shut, if filled with people. While this fact is before us touching the action of the lungs and the circulation of the life current in the body, is it not passing strange that—intelligent as we claim to be in reference to health and happiness—we do not rise and demand reform in all our churches in the question of heating and ventilating the same?

You will scarcely drink from the same glass with your friend, and yet you will sit and breathe over again and again the same deadly poison coming from hundreds about you.

You shrink from a dead body, and yet you can take into your lungs and have coursed through your entire physical system the "poisonous particles" which the bodies around you refuse to retain.

Says Dr. Cornell: "If the timorous, nice creatures who can scarcely set foot upon the ground; who are so delicate that they run distracted at the crawling of a worm, the flying of a bug, or the squeaking of a mouse, could see what they breathe at the midnight carousal, the very polite ball, and the sweet theatre, they would never be caught in such company again." But the ball-room and theatre are not the only places where impolite company attend. The black devil of carbonic acid gas attends church on Sabbath morning, and is more faithful in his attendance than the worshiper, as he often tarries the whole week or winter. He hides himself in the sanctuary of the Most High.

I ask to what extent will the officials (not the janitor) be held accountable if no provision is made for the escape of the noxious gas and the admission of oxygen to supply both minister and people? If these are scarcely saved, where shall the architect appear? But they tell us they have left a space in every window for the escape of the "poisonous vapors," which are thrown off by congregated hundreds, and sent out to be re-breathed. The little valves at the top of the windows are open, and yet the people are sluggish and stupid! Why is this? It is because the church is not ventilated. The congregation is not suspended ten or twenty feet in air. You have top ventilation, but the people are down among cushions in high-backed pews, fairly boxed in where the poison gas has settled about them, as it is the heavier, and the pure air, if there be any, has taken its flight upward.

Thank you, Mr. Architect, for the little openings at the window tops which are so high, yet they help a little if the room is over-heated. But Mr. A. sits under one of your air-valves with his overcoat off, hat off and hair off, and the janitor has pulled the silken cord and turned the valve at such an angle as to shoot a cold, winter current upon our unprotected brother. Mrs. B. has dressed herself, you would think, for a long ride in Greenland. She has her sealskin cloak on, her hair on, and her

hat on, and she is in an over-heated and unventilated church. Now, Mr. A. gives the silken cord a pull and the little valve closes. Mrs. B., out of compassion, sits patiently perspiring and panting until she can hear the benediction pronounced, and then, Mr. Janitor, she says, this heat is an outrage! Mr. A. meets the disheartened janitor and says, "Harley, you must pay a little more attention to the comfort of those who pay you for your labor. I have taken cold to-day and I go home with a chill upon me."

What is the remedy? I answer, ventilation.

Now, I will not weary you with the naming of the many plans of men for the proper ventilation of churches. I am sure you are all intelligent as to methods. What we desire most is to create a sentiment for reform upon this great question. It is reform we want for all the people.

Not all ministers are wise in church ventilation. Nor would we assume to know which is the best system for adoption. We were serving a church in Michigan, and we noticed rows of registers on the side walls near the ceiling. I asked the officials what they were for, and they told me that the former minister placed them there for ventilation, at his own expense. They possessed cords and tassels by which they were manipulated. I often thought that the cords could have been put to a better use. It were better that one should die than that all perish. I begged the Board to place the registers at the base as they would serve a better purpose, but not much better as there can be but little draft where there is no heat. Even chimneys, says David Crockett, the most of them smoke at the wrong end.

The American Cyclopædia has devoted seven pages of a high scientific order to ventilation. We refer you to Vol. XVI, page 451. * * *

Would you have a wide-awake minister? Ventilate your church! Would you have a wide-awake congregation? Ventilate your church! Again, I say, ventilate!

In closing Dr. Miller said the object of the Convention had been to awaken an interest among the people in sanitary questions. He hoped they would all go away with a desire which would lead them to know more about these matters. The papers, he said, had all been of unusual excellence, and it was to be regretted more time had not been had for their discussion. He returned the thanks of the State Board of Health to the people of Warren and to all others who had helped make the convention a success.

The President, in closing the Convention, said:

Ladies and Gentlemen: I have seldom, if ever, attended a Convention where so many able papers were presented on subjects of so vital importance to every community and to every family. I hope the influence of this Convention will not be limited to this audience. A full report of the proceedings should be published and widely distributed through the State. On account of the number of papers prepared and presented we have been obliged, very reluctantly, to cut short some of the discussions that were exceedingly interesting and profitable. These discussions can be continued in local meetings called for this purpose.

It seems to me it would be a good plan to have *County* Conventions held throughout the State to consider the important questions of water supply,

drainage, ventilation of public and private buildings, and pure, unadulterated foods, with reference to particular localities.

Some of the papers presented here should be published in the local journals of the State; in this way they would secure a wide circulation and general reading.

The subject of Sanitation, in some form, should have a place upon the programme of the Ohio Teachers' Association at its next meeting, and should be discussed in the Teachers' Institutes that will be held during the summer months. If the teachers are thoroughly instructed in these matters, and awake to their importance, great good may be accomplished through the schools of Ohio.

As chairman of the Convention, I have refrained from any participation in the discussions; on this account, I trust you will pardon me for referring at this time to one or two points brought out in yesterday's proceedings. The statement was made by some member of the Convention, that it would be better for a child to enter school at ten or eleven years of age than at six. It was approved by other speakers, and seemed to meet with little or no opposition.

With this opinion I cannot agree. If the child could have proper home training during the years from six to eleven, and could remain in school until the age of sixteen or seventeen years, it would be very different. But what are the facts in the case? The majority of children who are not in school are upon the street, and you can readily see the effect that the education received through this agency has upon the character and future welfare of the child. In the larger towns and cities so much evil is learned upon the street during the *sixth* year of the child's life that many educators, who have carefully studied this problem, have favored a change in the legal school age from six to *five* years. Besides, a large number of children are obliged to leave school at the age of twelve to aid in securing a maintenance for the family; hence, what they learn in school must be acquired before that time.

Some criticism has been made upon our public schools, in reference to overwork, lack of physical training, attention to light, improper seating, etc. To a certain extent this criticism may be just, and, so far as possible, it should lead to some remedy for these evils.

I wish to say, however, that in my own experience and observation covering a period of a good many years, I have known of but few instances of injury to pupils from the legitimate work of school; and in these cases the responsibility rest more with ambitious parents than with the teacher, or the system.

At the close of the year, when promotions are made, one of the most difficult tasks of the Superintendent is to convince parents that it is better for a child to remain a second year in the same grade, than to enter upon the work of the advanced grade unprepared.

Oftentimes the outside requirements of music, German, or French, and especially *society*, encroach so much upon the time and strength of the pupil as to interfere greatly with the work of the school.

The school curriculum is not, and cannot be arranged with reference to these outside requirements.

Frequently pupils are indifferent and careless in reference to their work during a great portion of time, and at the close of the term or year, they endeavor to do in a *week* the work of a month.

I believe that, as a rule, the evils complained of as resulting from over-pressure are due to the causes named, much more than to the teacher or the system.

From a somewhat extensive acquaintance with the teachers of the State, I can safely say that the majority of them are aiming to give the best physical and moral training, as well as intellectual.

I congratulate the State Board of Health on the success of the first Sanitary Convention held under its auspices, and trust it is the beginning of a movement that will result in great good to the people of our State.

During the past two or three years much interest has been awakened in sanitary science. Thirty states now have regularly appointed boards of health, whose reports are published annually. Excellent sanitary journals are issued monthly and weekly.

The people, as well as doctors and scientists, are beginning to read and to think upon these subjects.

May we not expect that the next few years will bring such changes as will result in more healthful, and, consequently, happier homes.

We suspend the thermometer in our rooms, and from it we ascertain the temperature of the air.

The barometer gives us the density of the atmosphere.

Who knows but, in the near future, some other instrument may be invented which will indicate the degree of *purity* of the air we breathe in the church, in the school-room, and in the home.

There being no further business, I now declare this Convention adjourned *sine die*.



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